Environmental Commissioner of Ontario

ANNUAL ENERGY CONSERVATION PROGRESS REPORT – 2012 (VOLUME ONE)

Building Momentum

Provincial Policies for Municipal Energy and Carbon Reductions

LIST OF ACRONYMS

AMO	Association of Municipalities of Ontario
CHEERIO	Collaboration on Home Energy Efficiency Retrofits in Ontario
CHP	Combined Heat and Power
CHPSOP	Combined Heat and Power Standard Offer Program
DC	Development Charge
DCA	*Development Charges Act, 1997*
EBR	*Environmental Bill of Rights, 1993*
ECO	Environmental Commissioner of Ontario
FCM	Federation of Canadian Municipalities
FIT	Feed-in Tariff
GHG	Greenhouse Gas
GMF	Green Municipal Fund
GWh	Gigawatt-hour
IESO	Independent Electricity System Operator
IO	Infrastructure Ontario
LEED	Leadership in Energy and Environmental Design
LIC	Local Improvement Charge
MMAH	Ministry of Municipal Affairs and Housing
Mt	Megatonne
OBC	Ontario Building Code
OEB	Ontario Energy Board
OMB	Ontario Municipal Board
OPA	Ontario Power Authority
PACE	Property Assessed Clean Energy
PPS	Provincial Policy Statement
TGS	Toronto Green Standard
TRC	Total Resource Cost (test)

Environmental
Commissioner
of Ontario

Commissaire à
l'environnement
de l'Ontario

Gord Miller, B.Sc., M.Sc.
Commissioner

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Commissaire

September 2013

The Honourable Dave Levac
Speaker of the Legislative Assembly of Ontario

Room 180, Legislative Building
Legislative Assembly
Province of Ontario
Queen's Park

Dear Speaker:

In accordance with section 58.1 of the *Environmental Bill of Rights, 1993*, I am pleased to present to you Volume One of the Annual Energy Conservation Progress Report – 2012 of the Environmental Commissioner of Ontario for your submission to the Legislative Assembly of Ontario.

The Annual Energy Conservation Progress Report – 2012 is my independent review of the Ontario government's progress in conserving energy and will be issued in two separate documents. This first volume covers the broader policy framework affecting energy conservation in Ontario. The second volume, to be released later this year, will describe initiatives underway, assess energy savings derived from these initiatives and measure progress on meeting targets.

Sincerely,

Gord Miller

Environmental Commissioner of Ontario

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Executive Summary

UNDER THE *ENVIRONMENTAL BILL OF RIGHTS, 1993*, THE ENVIRONMENTAL COMMISSIONER OF ONTARIO (ECO) REPORTS ANNUALLY TO THE LEGISLATIVE ASSEMBLY OF ONTARIO ON THE GOVERNMENT'S PROGRESS IN ENERGY CONSERVATION.

This report is volume one of the 2012 annual energy conservation progress report, and its purpose is to review major policy developments. In 2012, the Ontario government initiated very little new energy conservation policy. However, at the municipal level, local governments are showing policy leadership in conserving energy and mitigating climate change. Given these conditions, this report focuses on conservation policies where provincial-municipal responsibilities cross paths and where barriers that exist could be removed. The report was informed by consultation with municipal stakeholders.

Municipalities exert either direct control or indirect influence over energy used within their jurisdictional boundaries, for example through municipally owned buildings, fleets, street lighting or through their policy and planning role in such areas as land use, development controls and transit. Significantly, by 2020, municipalities are forecast to control or influence over one-half of Ontario's greenhouse gas (GHG) emissions. With so much at stake, it is essential that municipalities set and achieve their own energy and emissions reduction targets in order to contribute to provincial objectives. There is tremendous potential for municipalities to be leaders and partners with the provincial government to make a real difference in the patterns of energy use and the release of GHGs within communities.

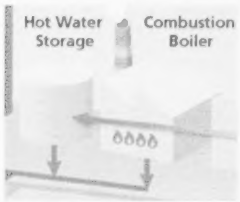
Municipal District Energy Systems: Charting a Path to Greener Heating and Cooling

Space heating and cooling accounts for a large share of the energy use and GHG emissions in Ontario. Many Ontario municipalities are examining whether a non-traditional approach to heating and cooling buildings, known as district energy, can provide them with an efficient, low-carbon option to meet some of their energy needs. District energy systems provide heating and/or cooling services to multiple buildings connected to a distribution network that transports hot or chilled water through pipes. They can often provide heating and cooling more efficiently than traditional systems in which each building contains its own equipment, and can use low-carbon fuels and technologies, such as waste heat from industry, solar thermal and others to reduce GHG emissions.

Although a number of district energy systems already exist in Ontario, there are still barriers that hinder municipal interest in developing lower-carbon district systems. A key barrier is the higher upfront capital cost of district energy, and uncertainty for district energy owners as to whether they will be able to recover this cost from customers, particularly if some buildings within range choose not to connect to the district energy system. This barrier can be exacerbated by the potentially higher cost of low-carbon technology.

Ontario municipalities have planning powers to influence the establishment and growth of district energy systems and connection of buildings to them. Municipal official plans can express a municipality's policy preference for district energy development, and the policies in the official plan can then be applied to site-specific development approvals. Some municipalities with an interest in district energy have begun to make use of their planning tools. Municipal district energy policies are quite new and could be challenged through appeals of planning decisions to the Ontario Municipal Board.

The ECO believes Ontario should ensure the provincial planning framework supports municipalities that wish to use their planning powers to encourage connections to low-emission district energy systems. This would guide municipal planners and in principle should reduce appeals to the Ontario Municipal Board of municipal district energy policies. This can be done by including language in the Provincial Policy Statement and *Planning Act* that supports the goals of reducing energy consumption and GHG emissions in all sectors.



The ECO recommends that the Ministry of Municipal Affairs and Housing update the Provincial Policy Statement to support low-carbon thermal energy systems.

The ECO notes that the province could be more proactive in providing opportunities for provincially owned buildings to be district energy customers. While the province has connected the Queen's Park administrative complex to a district energy system, the ECO is aware that other financially feasible opportunities to connect provincial buildings elsewhere in the province to district energy systems have not progressed. The use of district energy would be consistent with the province's own energy-related guiding principles for government facilities, as stated in the *Green Energy Act, 2009*.

The ECO recommends that the Ministry of Infrastructure direct Infrastructure Ontario to update its Energy Master Plan to assess opportunities for connecting provincial buildings to district energy systems.

Development Charges: Tackling Sprawl and Funding Transit

Many Ontario municipalities are growing in size and population, requiring new infrastructure and expanded services (e.g., water, sewage, transit, and police). Various revenue tools help finance the costs associated with new development, including property taxes, user fees and development charges (DCs). Municipalities collect DCs from developers to help offset the one-time capital costs associated with the provision of new infrastructure and services. The underlying principle is that growth-related development (both residential and non-residential) should pay for itself and not place a financial burden on the tax base of established communities.

Used primarily as a tool to generate revenues, DCs are often overlooked as a planning tool to influence whether growth is compact or sprawling. Where compact, transit-friendly communities are developed, transportation-related energy consumption and GHG emissions can be reduced. Where sprawl occurs and home owners are car dependent, then energy use and emissions increase.

Over the last several years, the provincial government has attempted to shift development patterns and encourage more intensive land use and compact growth through planning policies, such as the Growth Plan for the Greater Golden Horseshoe, 2006.

In designing a DC regime, municipalities typically have used a municipal-wide, average-cost approach, which estimates the infrastructure costs required by new development within the jurisdiction. The cost is then assigned on a municipal-wide basis across all new units developed, regardless of location or the true cost of the services provided. This is problematic, given that both the density of a development and its location has a significant influence on the costs of providing services. If the location and density of the development is not incorporated in the DC, then areas that cost less to service subsidize development in higher-cost areas, and denser building patterns will subsidize low-density developments. Similar cross-subsidization issues exist if lot size is not included.

While many factors influence where new municipal development occurs, DCs represent a substantial cost and can influence development decisions. The province should direct and guide municipalities on the role that fiscal tools, such as DCs, can play in encouraging smart growth or energy-efficient development. This may prove particularly valuable for municipalities whose planning departments are only peripherally involved in designing the DCs, and where DC fee structures undermine the municipality's land use planning objectives and policies.

The ECO recommends that the Ministry of Municipal Affairs and Housing produce a best practices guide that outlines how development charges can be used to encourage more compact and sustainable communities.

In 1997, legislative changes were made that restricted the manner by which DCs could be allocated for transit service. First, a 10-year average historical service level cap was imposed, which means that the level of transit service funded through any DC cannot exceed the average service level provided over the previous 10 years. Second, municipalities must apply a 10 per cent reduction to the growth-related net capital costs for transit prior to calculating the charge. In contrast, they are permitted to recover up to 100 per cent of the growth-related net capital costs for several other services, including roads. Concerns have been expressed about the impact of these restrictions on improving or expanding transit and whether they undermine efforts to develop more transit-oriented communities.

The ECO recognizes that funding transit infrastructure is challenging and complex with no silver bullet solution. Nevertheless, reform of the *Development Charges Act, 1997* to allow municipalities greater transit funding is one of many possible revenue sources that should be seriously considered by the provincial government. Both the 10 per cent discount and the historic 10-year average service level standard should be examined and changed. Curiously, in 2006 the Toronto-York Spadina Subway Extension Project was exempt from these two restrictions, which clearly demonstrates that the current framework is flawed and must be amended.

The ECO recommends that the Ministry of Municipal Affairs and Housing amend the *Development Charges Act, 1997* to expand the ability of municipalities to fund growth-related public transit services through development charges.

Measuring Municipal Energy Consumption: Progress in Implementing O. Reg. 397/11

In 2009, the provincial government committed to help public agencies, including municipalities, manage their energy consumption. In January 2012, O. Reg. 397/11 under the *Green Energy Act, 2009,* came into force and required municipalities to do two things. First, they must produce an annual energy consumption and GHG emissions report for designated municipal facilities, such as public libraries, parking garages and fire stations. The second requirement is to prepare five-year energy conservation and demand management plans, which are due by July 1, 2014. These two requirements will produce valuable energy usage data that otherwise would not be available.

The first annual energy consumption and GHG emissions reports were due on July 1, 2013. These municipal reports must be submitted to the government and also made publicly available for at least a year, until the subsequent year's edition is posted. The ECO believes, however, that O. Reg. 397/11 should be improved by requiring that all reports be available to the public with records maintained indefinitely. Since this information may be difficult for the public to find, or may not be displayed consistently on municipal websites, the Ministry of Energy should host all filed energy reports in a central Internet location, to facilitate public access and comparison.

The ECO recommends that the Ministry of Energy make all energy reports and plans it receives from the broader public sector permanently available on its website in a consistent format.

Retrofitting Buildings Using Local Improvement Charges

Some municipalities hope to expand the use of an existing municipal revenue tool, the local improvement charge (LIC), to finance retrofits of homes, particularly older buildings that require high amounts of energy for heating and cooling. This would enable municipalities interested in reducing energy consumption or GHG emissions to use LICs to fund actions by property owners to improve a building's energy efficiency or use renewable energy.

LICs recover the costs of the retrofit project from the specific property owners that benefit from the project, with the LIC appearing as an additional charge on each affected owner's property tax bill. If a property with an LIC is sold, the obligation to pay the remaining balance of the LIC falls to the new owner. Since all costs are recovered only from participating property owners as opposed to recovering the costs from all residents through property taxes, there is no net financial impact on the municipality or other municipal taxpayers.

The LIC offers several benefits in comparison with other financing mechanisms that a property owner might use to fund energy efficiency investments, for example: financing can be made available to property owners of all incomes and mortgage amounts; municipalities may be able to offer financing through the LIC at lower interest rates than other financing options; and, LIC financing may be more attractive to owners who intend to sell the property in the near term, and might otherwise be unwilling to make a large investment in a retrofit.

In October 2012, through regulatory amendments, the Ministry of Municipal Affairs and Housing made changes to how energy improvements on private property can be made using LICs. The ECO commends the ministry for providing a clear legal framework for municipalities to use LICs to finance energy improvements.

Municipalities have shown substantial interest in developing LIC-based energy retrofit programs in the months since the regulatory amendments; in August 2013, the City of Toronto was the first to establish a program. Much of the initial work has been undertaken by the Collaboration on Home Energy Efficiency Retrofits in Ontario which has the participation of twenty-two municipalities.

The ECO believes that further provincial help is desirable. Municipalities indicated that they may need assistance in establishing an initial seed fund for loans to property owners. One possible funding option is the Infrastructure Ontario Loan Program, which currently provides loans to municipalities for infrastructure investments. The rates offered are usually lower than municipalities could obtain elsewhere, which could be passed on as lower overall retrofit costs to property owners, potentially attracting more program participants. However, it is unclear whether this loan program can be used to fund an LIC-based energy retrofit program, as the use of funds would not be for municipally owned or operated capital projects.

The ECO recommends that the Ministry of Infrastructure offer Infrastructure Ontario loans to municipalities as an option to facilitate home energy retrofits through local improvement charges.

1 Introduction

Communities play a central role in the quality of life that Canadians enjoy. They also account for close to 60 per cent of the nation's energy consumption ... Provincial and territorial governments are important players because they define the legislative frameworks under which municipalities operate. They are responsible for much of the regulation of the energy resources sector and can greatly influence the capacity of utilities and energy companies to actively support [community energy solutions].

Integrated Community Energy Solutions,
Council of Energy Ministers, 2009.

Municipal governments are fundamental to achieving local, community-based emission reductions since they have significant influence on development and land-use decisions that shape the pattern of energy use within communities. Municipal governments are also the order of government that is the closest to citizens and can most easily engage households and businesses to implement local projects to reduce GHG emissions.

Act Locally: The Municipal Role in Fighting Climate Change,
Federation of Canadian Municipalities, 2009.

1.1 THE ECO'S MANDATE AND REPORTING APPROACH

The Environmental Commissioner of Ontario (ECO) is required under the *Environmental Bill of Rights, 1993 (EBR)* to report annually to the Speaker of the Legislative Assembly of Ontario on the province's progress in energy conservation.

Our reporting mandate is to: review the progress in reducing or making more efficient use of transportation fuels, oil, propane, natural gas and electricity; measure the achievement of government-established energy conservation targets; and assess barriers to conservation and efficiency. Reports are issued bi-annually as volume one and two for each year. This report, the Annual Energy Conservation Progress Report – 2012 (Volume One), reviews major policy developments. Volume Two, to be released later in 2013, is data-focused and analyzes conservation programs, reviews initiatives undertaken and measures progress toward targets.[1]

1.2 CONTEXT OF THE REPORT

The energy and greenhouse gas (GHG) policy files were quite dormant in 2012, with the exception of local improvement charges (see Section 5 of this report), appliance efficiency standards and the new 2012 Building Code's energy efficiency requirements (see the ECO's forthcoming Volume Two report). Similarly, as discussed in our Annual Greenhouse Gas Progress Report 2012, the government made negligible progress during 2012 in closing the gap towards achieving its greenhouse gas reduction targets. Consequently, there is little provincial policy on which to report.

However, many Ontario municipalities are demonstrating leadership in addressing the issues of energy conservation and the mitigation of climate change across a range of policy fields. Given these conditions and the ECO's mandate to report to the provincial legislature, we have chosen selected policies where provincial and municipal responsibilities intersect and barriers exist which could be removed to facilitate further energy and emissions reductions and where the nexus between provincial policy and municipal action should be reformed.

1.3 LINKING ENERGY CONSERVATION AND GHG REDUCTIONS AT THE MUNICIPAL LEVEL

Municipalities exert significant influence over the amounts and sources of energy used within their jurisdictional boundaries, as well as the related environmental repercussions of those consumption patterns. In particular, the use of fossil fuels – primarily the natural gas used for heating and various transportation fuels – makes a major contribution to local and regional GHG emissions.

The Federation of Canadian Municipalities (FCM) calculates that municipal governments "currently have direct or indirect control over approximately 44 per cent of national GHG emissions in Canada."[2] End-use sectors under *direct* municipal control include municipal operations – such as municipally owned buildings, fleets, water and sewer infrastructure, street lighting – and waste management at landfill sites and recycling depots.

Municipalities also have the ability to *indirectly* influence the level of energy consumption and GHG emissions within their jurisdictions through their policy and planning role in such areas as land use, development controls, public transit access and building codes. Using FCM's estimate of emissions under municipal control or influence and applying it to the entire province, based on its share of national emissions, the ECO has estimated the size of the prize in Ontario at roughly 75 megatonnes (Mt) as of 2011.

Table 1: GHG Emissions in Ontario under the Direct Control or Influence of Municipal Governments (1990, 2006 and 2020)[3]

	End Use Sector	Report Section(s)	Estimated Ontario Emissions (Mt CO_2e)		
			1990	2006	2020 (forecast)
Direct Control	Municipal Operations	2, 4	1.0	1.1	1.2
	Landfill Gas and Waste Management	Not in report	5.4	5.4	6.4
	Subtotal		**6.4**	**6.5**	**7.6**
Influence	Residential Buildings	5	20.7	18.9	19.3
	Commercial and Institutional Buildings (excluding municipal)	2	13.6	15.5	16.0
	Industry (excluding primary industries)	Not in report	9.5	8.3	9.8
	Personal and Freight Transportation in Communities (excluding rail, marine and off-road)	3	29.5	36.0	42.9
	Subtotal		**73.3**	**78.7**	**88.0**
Total Municipal Direct Control or Influence			**79.7**	**85.2**	**95.6**
Ontario Total Emissions			177	196	177
Municipal Control in Ontario (%)			45.0%	43.5%	54.0%

Note: Actual Ontario emissions differ from the estimated emissions for each of the end use sectors shown in Table 1, due to differences in the relative importance of each sector between Ontario and Canada as a whole.

Sources: Federation of Canadian Municipalities, *Act Locally: The Municipal Role in Fighting Climate Change* (2009).

Environment Canada, *National Inventory Report* (2013).

Environment Canada, *National Inventory Report* (2012).

Environment Canada, *Canada's Emissions Trends 2012* (2012).

Ontario Ministry of the Environment, *Climate Vision: Climate Change Progress Report: Technical Appendix* (2012).

With so much skin in the game – by 2020, municipalities are forecast to have direct control or influence over one-half of Ontario's GHG emissions – it is essential that municipalities set and achieve their own energy and emissions reduction targets in order to contribute to provincial objectives.[4] This is especially important since the ECO has observed in both our annual energy conservation and GHG progress reports that the Ontario government is not on track to meet either its 2014 electricity peak demand target or its Climate Change Action Plan GHG reduction targets.[5] As well, recent policy has frozen the conservation budgets of Ontario's two natural gas distributors, and trends show that gas savings for one of the two utilities have plateaued, despite the potential to achieve larger reductions of natural gas use (and associated GHG emissions) in a very cost-effective manner.[6]

In past reports,[7] the ECO has indicated that the formal linkages between Ontario's energy and GHG policies are weak, and the province lacks a comprehensive multi-fuel plan. This is troubling as most of the energy consumed in Ontario is used for thermal purposes (e.g., for heating homes, institutional and commercial buildings, and in industrial processes) and is provided primarily by natural gas. Similarly, fossil fuels comprise the overwhelming majority of energy sources used for transportation. These policy gaps have created a vacuum in which municipalities, lacking clear provincial direction, are using what regulatory levers they have. There is, therefore, a need for greater alignment between municipal and provincial objectives and actions in the areas of energy and climate policy. Given the financial, regulatory and other barriers that municipalities face, stronger provincial support and policy alignment would help them achieve the potential energy and climate outcomes that are within their control and influence.

1.3.1 A REALITY CHECK – CONSULTING WITH STAKEHOLDERS

As a first step in producing this report, the ECO met with two key municipal stakeholder groups – the Energy Task Force of the Association of Municipalities of Ontario and the Greater Toronto Area Clean Air Council. We asked both these groups the same key question: *"What can the Ontario government do to help municipalities take action to reduce all forms of energy consumption and decrease greenhouse gas emissions?"* We provided a list of potential topics and then we listened.

There was strong interest expressed in using development charges to fund further transit expansion, as well as in the potential for municipally owned or controlled district energy systems to improve energy efficiency while reducing GHG emissions. There was also interest in documenting best practices showing how municipalities are implementing the energy conservation plans required under O. Reg. 397/11 - Energy Conservation and Demand Management Plans, and how recent amendments to regulations under the *Municipal Act, 2001* will empower municipalities to use local improvement charges to help building owners reduce energy use and GHG emissions.

1.4 WHAT'S COVERED IN THIS REPORT

For this report, we have chosen a series of topics where provincial and municipal responsibilities intersect, and where barriers to action could be removed to facilitate further energy and emissions reductions. We were also guided by our discussions with the AMO Energy Task Force and the Greater Toronto Area Clean Air Council, as well as the views submitted by other interested organizations. Table 1 above highlights topics covered in this report and links them to particular end-use sectors. Our report covers government policies in sectors that are responsible for nearly 85 per cent of municipally controlled or influenced emissions.

Section 2 looks at how municipalities are using their own authority to enhance the role of district energy systems to significantly improve efficiency and reduce emissions. Taking a more strategic and longer-term view, **Section 3** explores the potential role municipal development charges could play in encouraging compact community design and funding transit expansion.

Sections 4 and 5 focus on municipalities taking action based on provincial direction. **Section 4** updates how municipalities are meeting their commitments to report on energy consumption and GHG emissions under O. Reg. 397/11. **Section 5** discusses how municipalities are planning to use an existing revenue tool – local improvement charges (LICs) – to finance home energy retrofits that reduce the use of energy while lowering a home's carbon footprint.

The report focuses on municipal initiatives that are reducing energy consumption today, as well as more strategic actions that will take time to bend the curve and help Ontario achieve its target of reducing GHG emissions 80 per cent below 1990 levels by 2050. Each of the topics covered in the report includes brief case studies illustrating how individual municipalities have taken action to conserve energy and reduce emissions.

There is tremendous potential for municipalities to be leaders and partners with the provincial government to make a real difference in the patterns of energy use and the release of GHGs within communities.

1.4.1 INVOLVING MUNICIPALITIES IN ENERGY PLANNING

In the summer of 2013, the Ministry of Energy announced a number of consultations and proposed policy changes that may improve municipal involvement in energy planning and have an impact on several of the issues discussed in this report.

Regional Electricity Planning: New power lines and transformer stations are often proposed to move electricity from the grid to a community in order to ensure a reliable supply of electricity. In some cases, conservation or small-scale local generation could eliminate or delay the need for some of these infrastructure investments at a lower cost. However, in the ECO's view, several recent Ontario Energy Board (OEB) hearings (most notably, Toronto Hydro's application for the new Bremner Transformer Station in Toronto's downtown core) have demonstrated that the existing electricity infrastructure approval process does not do a good job of encouraging the Ontario Power Authority (OPA) and electric utilities to compare distributed generation, conservation and wires options, and arrive at the best solution for electricity ratepayers and local residents.[8]

The OPA, OEB and electricity transmitters and distributors had been working to improve and formalize this process through a regional electricity planning model that would identify regional electricity needs and propose solutions.[9] The ECO is hopeful that a more formal regional electricity planning process will enable a better comparison of the alternatives (i.e., between conservation, distributed generation and wires). However, the AMO expressed concern that municipalities were unable to participate directly in the regional electricity planning process.[10]

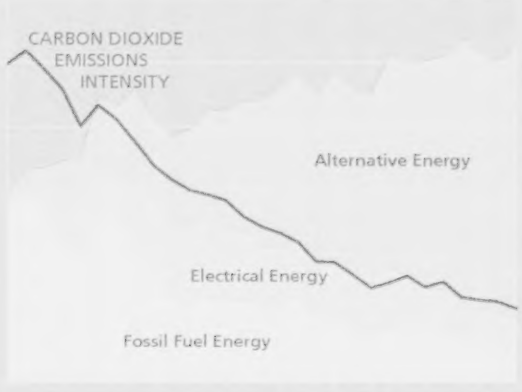
On May 6, 2013, the Minister of Energy addressed this concern by asking the OPA and the Independent Electricity System Operator (IESO) to develop recommendations to improve regional electricity planning. The Minister required that the planning process "feature transparent mechanisms on seeking input from municipalities," and broadened the scope of "regional planning" to include a role for municipal involvement in the siting of large electricity projects (a consequence of the costly relocations of the proposed Oakville and Mississauga gas generation plants due to local opposition).

On August 1, 2013, the OPA and the IESO reported back to the Minister of Energy. Their report recommended a tighter integration between municipal planning and electricity planning. The report recommended that regional electricity plans should be required to consider municipal priorities and also suggested that the government should explore mechanisms that would provide flexibility to municipalities who prefer a specific solution to meet the needs of their local area. These developments may provide a greater role for municipalities to propose alternatives to identified electricity infrastructure projects.

Municipal Energy Plans: On a related front, the Ministry of Energy has launched a new program that will provide financial support to small- and medium-sized municipalities that wish to develop municipal energy plans integrating energy, infrastructure, growth and land use planning.[11] Municipalities will be able to use their municipal energy plans to articulate their priorities in the regional electricity planning process. Municipal energy plans will have a broader energy focus that includes not only electricity but other fuels as well.

2 Municipal District Energy Systems: Charting a Path to Greener Heating and Cooling

District energy systems can use non-conventional energy sources and technologies that may be cost prohibitive or technically impractical for heating or cooling a single building. Examples of innovative low-carbon technologies that can be integrated into a district energy system are biomass, waste heat from industry, solar thermal, geoexchange (ground source heating and cooling), deep lake water cooling, and energy storage. Over the past 30 years, Sweden's district heating fuel mix has transitioned from heating oil to a range of resources dominated by renewables, reducing the greenhouse gas emissions intensity of district heating by 80 per cent.



District Energy Fuel Mix in Sweden

2.1 INTRODUCTION

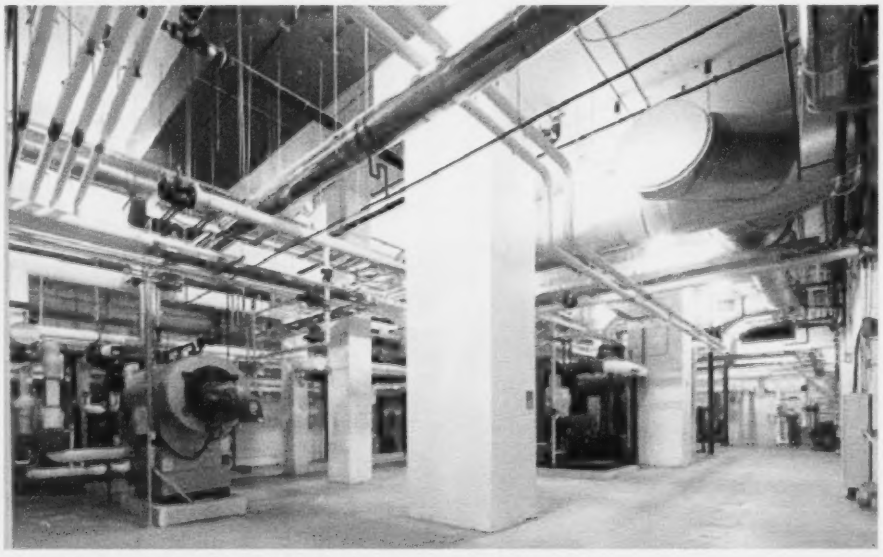
CONTROLLING THE INDOOR CLIMATE OF OUR BUILDINGS THROUGH SPACE HEATING AND COOLING ACCOUNTS FOR A LARGE SHARE OF THE ENERGY USE AND GREENHOUSE GAS (GHG) EMISSIONS IN ONTARIO.

The traditional method of heating and cooling buildings has been to house the mechanical equipment within each individual building. However, many Ontario municipalities are examining whether a different approach, known as district energy, can play an important role in their energy future.

District energy systems provide heating and/or cooling services to multiple buildings, using a distribution network that transports hot or chilled water (some older district energy systems use steam) through pipes to connected buildings.

The distribution network of a district energy system has parallels to the electricity, gas and water distribution networks. Buildings tied in to a district energy system do not need their own space heating or cooling equipment (e.g., furnaces/boilers, chillers/air conditioners). Instead, this equipment is housed off-site (often in a central energy plant) where it is used to raise or lower the water temperature in the district energy piping network before it reaches connected buildings. Many district energy systems make use of combined heat and power (CHP) technology that produces electricity in addition to heat, but this is not essential – the defining characteristic of a district energy system is its distribution of **thermal** energy to multiple buildings. These urban heat networks form a thermal grid that can often provide energy more efficiently than the heating/cooling equipment in individual buildings, and are even more attractive if they can capture and use waste heat from such sources as the heat vented by industry or power plants, or contained in sewers and wastewater, using technologies like heat exchangers and heat pumps.

As noted previously by the ECO, Ontario can improve its energy efficiency by using waste heat and feeding it into complementary nearby facilities or district heating and cooling systems.[12] Co-ordinating provincial policy with municipal planning processes will support the growth of district energy.



Regent Park, Photo: Canadian Mortgage and Housing Corporation

District energy currently plays a much larger role in Europe than in North America, serving more than 10 per cent of total heat demand for the continent, a share that rises to more than 50 per cent in some northern European nations. In recent years, Ontario municipalities have shown an increased interest in establishing district energy systems, particularly in high-density cores and areas of new development, where the economic case for district energy is more attractive. Some notable projects include the establishment in 1999 of Markham District Energy Inc. to serve Markham's new downtown centre, Enwave Energy Corporation's innovative deep lake water cooling system for Toronto's downtown core (that became operational in 2004), and Hamilton Community Energy's district energy system to serve downtown Hamilton (launched in 2002). While Toronto has sold its share in the deep lake water cooling system, it has again become an owner of a district energy system through the Regent Park re-development project, and continues to explore other opportunities for new district energy systems. Other municipalities that have shown an interest in developing district energy systems in recent years include Guelph, East Gwillimbury, Richmond Hill, Dryden and Pickering.

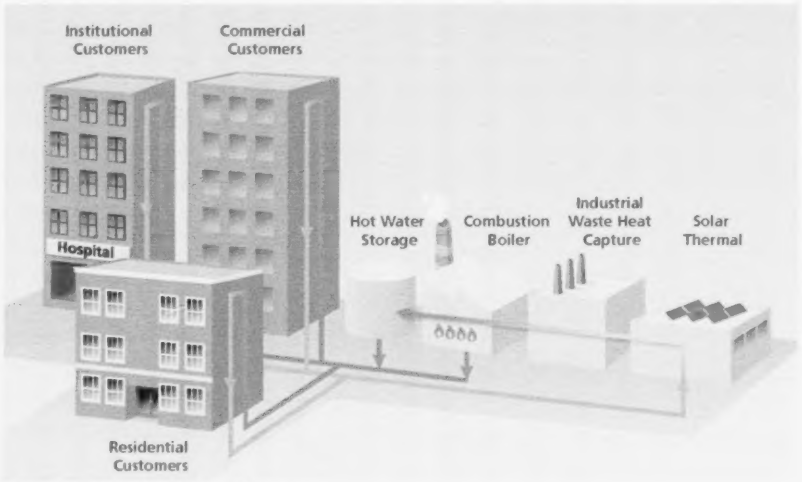


Figure 1: District Energy System

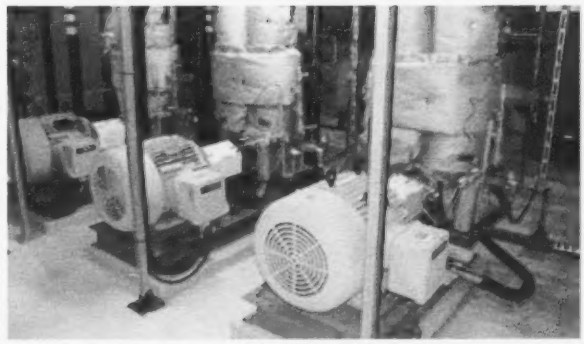
2.2 ENERGY AND EMISSIONS BENEFITS OF DISTRICT ENERGY

District energy systems have the potential to reduce energy consumption and GHG emissions when compared with conventional building heating and cooling systems. However, this is not always the case, as the performance of district energy systems depends on a number of factors and can vary widely.

The centralized operation and maintenance of a district energy system can reduce energy consumption. Traditional mechanical systems in individual buildings may not be regularly maintained, and their energy efficiency may deteriorate over time. In addition, boilers and chillers in individual buildings often need to run at low loading levels where their efficiency declines sharply. This is less likely in district energy systems serving multiple buildings, which will usually have a more consistent energy demand and can utilize multiple heating/cooling units in a modular fashion. These efficiency improvements are offset to some degree by heat loss from piping in district energy systems. However, high density developments, moderate water supply temperatures and insulated piping can help minimize these losses.

Many district energy systems include natural gas-fired CHP units. The use of more fuel efficient CHP technology offers great potential for improving energy efficiency while reducing GHG emissions in jurisdictions where most electricity is supplied by fossil fuels. In Ontario, however, the potential for emissions reductions from natural gas-fired CHP is not as clear-cut; more than 80 per cent of Ontario's electricity supply comes from carbon-free sources, either nuclear or renewable.[13] Only during hours of peak electricity demand, when a gas-fired CHP unit may directly reduce the need for generation from larger gas-fired units, is there a potential for emissions reductions. Of course, CHP can provide other benefits, such as resilience in the event of a failure in the provincial electricity grid. For more information on CHP systems in Ontario, refer to Section 3.1 of the ECO's Annual Energy Conservation Progress Report - 2011 (Volume Two).

An analysis performed by Hamilton Community Energy for Hamilton's natural gas-fired district energy system found that greenhouse gas emissions from the system between 2003 and 2009 were approximately 30 per cent lower than would have been emitted had the heat and electricity been produced by conventional means. The emissions reductions were due to a combination of higher-efficiency heating technology, and the use of CHP to reduce the use of fossil-fueled electricity generation on the provincial grid.[14]



Sudbury District Energy, Photo: Toromont

Probably the greatest potential environmental benefit of district energy systems is their ability to use non-conventional energy sources and technologies that may be cost prohibitive or technically impractical for heating or cooling a single building. The default energy sources in both district energy systems and traditional in-building systems are natural gas (for heating) and electricity (for cooling). However, district energy systems can more easily supplement or replace these sources with low-carbon fuels and technologies. For example, switching from coal or natural gas to wood waste in a district energy system, as was done in 2003 by the large municipal district energy system in St. Paul, Minnesota, requires only changes to the central plant. No action is needed by the end users, who may not even be aware of the fuel change. Other examples of innovative technologies that can be integrated into a district energy system are waste heat from industry, solar thermal, deep lake water cooling, geoexchange (ground source heating and cooling) and energy storage. The history of district heating in Sweden is instructive in this regard. Over the past 30 years, Sweden's district heating fuel mix has transitioned from heating oil to a range of resources dominated by renewables, thereby reducing the GHG emissions intensity of district heating by 80 per cent.

2.3 THE MUNICIPAL INTEREST IN DISTRICT ENERGY

Why would a municipal council want to encourage district energy within its community? The reasons go beyond the potential energy savings and emissions benefits, although these may be important enough considerations, particularly for municipalities that have set energy or emissions reduction targets. Some municipalities see district energy as a fundamental component of a broader community energy plan that attempts to integrate energy and land use planning.[15] District energy supports local improvement efforts by drawing on local energy resources, and providing local jobs. It also can offer a measure of resilience, as many district energy systems that include combined heat and power can operate in island mode, if necessary,

meaning that they can continue to supply electricity to connected buildings in the event of a failure in the provincial grid. This security of supply can be an attractive selling point for customers who rely on an uninterrupted supply of power.

Municipalities that want to encourage district energy can do so in several ways. Most obviously, they can commit that municipal buildings will serve as customers of the proposed district energy system, perhaps serving as the anchor tenant needed to make a system economically viable. Municipalities can also flex their municipal planning powers, both to encourage other customers to connect and to smooth the approvals process for siting the energy production plant. A municipality may also be able to make land available for the central energy plant and provide access to municipal rights-of-way for the piping network.

Yet municipalities often go beyond being an enabler of district energy to being an owner, as shown in Table 2. Given their planning powers and potential to guarantee an initial customer base of municipally owned buildings, municipalities may be willing to take the risk of building a district energy system where private sector operators would not. Municipalities can also access specialized funding streams from the federal or provincial governments, as discussed in Section 2.4. Municipalities may also be uniquely positioned to tap into energy supply sources for heat – notably the municipal waste and wastewater streams.[16] Finally, most Ontario municipalities own the local water and electric utilities, which have expertise in infrastructure investments (including piping and underground development), and may be well positioned to undertake district energy developments.

Table 2: Ownership Model of Selected Ontario Municipal District Energy Systems

District Energy System, Municipality	Ownership Model
Markham District Energy, Markham	Municipally owned, no corporate relationship to electric utility
EnWave Energy Corporation, Toronto	Privately owned (previously partially owned by City of Toronto)
Hamilton Community Energy, Hamilton	Municipally owned, through multi-utility holding corporation that also owns majority interest in electric utility
Regent Park Energy, Toronto	Municipally owned, through Toronto Community Housing
District Energy Windsor, Windsor	Distribution piping municipally owned, through municipal water utility; central heating and cooling equipment privately owned
Sudbury District Energy Corporation, Sudbury	Public/private partnership, public ownership through multi-utility holding corporation that also holds electric utility
Index Energy, Ajax (under development)	Privately owned, with municipal profit-sharing agreement
Durham College District Energy, Oshawa	Municipally owned, through multi-utility holding corporation that also holds electric utility
London District Energy, London	Privately owned

Note: Does not include Ontario district energy systems owned by other public sector organizations (e.g., hospitals, educational institutions).

Although a number of district energy systems already exist in Ontario, there are still barriers that can hinder municipal interest in developing lower-carbon district energy systems. A key barrier is the higher upfront capital cost of district energy, and uncertainty for district energy owners as to whether they will be able to recover this cost from customers, particularly if some buildings within range choose not to connect to the district energy system. This barrier can be exacerbated by the potentially higher cost of low-carbon technology. There are two areas of policy where action by the provincial government could help overcome this barrier: (1) provincial financial incentives (including incentives offered by gas and electric utilities); and (2) urban planning legislation and policy.

2.4 FINANCIAL INCENTIVES FOR LOW-CARBON DISTRICT ENERGY SYSTEMS

Government incentives are available to help municipalities with the capital costs of district energy systems. These incentives fall into two categories: (1) municipal infrastructure funding programs, and (2) incentives for energy conservation or efficient electricity generation offered by the Ontario Power Authority (OPA), gas, and electric utilities.

Infrastructure Incentives: The federal government's Gas Tax Fund provides approximately $60 per resident per year in infrastructure funding to all municipalities, and community energy systems is an eligible funding category (in contrast, municipal use of the provincially allocated portion of gas tax revenue is restricted to funding municipal transit). In addition, the federally funded Green Municipal Fund (GMF), run by the Federation of Canadian Municipalities, provides loans and grants for municipal environmental initiatives. Several municipalities have accessed GMF funding to undertake district energy feasibility studies, while Markham and Toronto have also used the program to access loans and grants for construction of district energy projects.[17] Markham has also made extensive use of the Gas Tax Fund to build its district energy system.

At the provincial level, the one relevant program is the Infrastructure Ontario loan program, which offers low-rate loans for municipal capital investments. To date, the program has provided $50 million in loans for district energy systems.[18]

Installation of EnWave Deep Lake Water Cooling, Photo: Enwave Energy Corporation

Both the federal Gas Tax Fund and Infrastructure Ontario loans can be used for many types of projects, so district energy must compete with other municipal capital investment priorities. (The GMF is slightly different, as it does not guarantee funding to all municipalities and allocates much of its funding on a competitive basis). On the other hand, incentives from the OPA and gas utilities are specifically targeted at reducing energy consumption or increasing efficient or low-carbon electricity generation and, thus, have a more direct policy focus that could favour district energy systems over a business-as-usual approach to energy supply and use.

Electricity Generation Incentives: For certain qualifying district energy systems that include electricity generation from CHP, the Ontario government has attempted to provide financial incentives through OPA programs that guarantee a fixed rate of payment for the electricity generated. CHP systems powered by bioenergy (biomass, biogas or landfill gas) are eligible under the Feed-in Tariff (FIT) program for a rate of between 10-20 cents per kilowatt-hour, depending on the specific technology. Non-renewable CHP systems (primarily natural gas) less than 20 megawatts (MW) in size are eligible for the Combined Heat and Power Standard Offer program (CHPSOP), which also guarantees a fixed payment for electricity produced.

As reviewed in a previous ECO report,[19] only two contracts had been offered through the end of 2012 through CHPSOP – both to district energy projects for Markham District Energy. Twelve additional district energy projects applied for a CHPSOP contract, four of which had a municipal ownership interest.[20] The OPA has recently indicated that some of these applicants may be offered contracts, while others will not. The OPA will likely restrict future CHP procurements to certain regions in Ontario where a need for generation has been identified through the regional planning process (see Section 1.4.1).[21] The reduced likelihood of obtaining a CHPSOP contract may slow the development of district energy systems; in many cases, the electricity contract is needed to make the project economically viable.

Conservation Incentives: District energy projects should be eligible for conservation incentives offered by the OPA if they reduce overall electricity consumption or peak electrical demand. Likewise, district energy projects should be eligible for incentives from gas utilities if they reduce natural gas consumption. While district energy projects do not always fit neatly into existing program categories, gas utilities and the OPA have been able to offer incentives for specific technology improvements. For example, Union Gas has provided incentive funding to London District Energy to improve the insulation on some if its distribution piping. Similarly, Hamilton received OPA funding to cover a portion of the cost of replacing its aging chillers with a new district cooling system.

Generally, incentives for electricity and natural gas conservation are available only for initiatives that are cost-effective (in an environment where there is no price on carbon). Innovative elements of a district energy system that reduce GHG emissions –

Case Study

McMaster Innovation Park – The District Energy System of the Future?

Perhaps the most environmentally impressive district energy system in Ontario sits on a former brownfield site in Hamilton. Designed, built and operated by Hamilton Community Energy and opened in 2011, the district energy system provides heating and cooling services to three large buildings – the McMaster Innovation Park Atrium, the CANMET Materials Technology Laboratory and the McMaster Automotive Resource Centre. The core of the system is an underground geoexchange field, through which the district energy piping circulates. The stable temperature beneath the surface raises the water temperature in the pipes in winter and lowers the water temperature in summer. Used in combination with electrically powered heat pumps that further raise or lower the water temperature as needed, the geoexchange system provides extremely high efficiency heating and cooling. Used in heating mode, the geoexchange system is expected to deliver more than three units of output energy for each unit of input energy.

The CANMET building is also equipped with solar thermal panels on the roof that can be utilized directly for hot water or space heating, or used to raise the temperature of the water in the geoexchange system for later use in the heating season. Traditional chillers for cooling and gas-fired boilers for heating are only used as supplementary inputs to the district energy system during periods where building demand for heating or cooling is particularly high, as the geoexchange system is sized to provide the bulk, nearly 85 per cent, of the annual heating and cooling energy demand. McMaster Innovation Park provides a blueprint for the low-emissions thermal energy systems of the future.

for example, geoexchange, solar thermal, waste heat capture – may not be able to pass this cost-effectiveness threshold, particularly if they reduce the use of natural gas (because the cost of natural gas is currently so low). This issue is discussed further in Section 2.4.1.

2.4.1 COST-BENEFIT ANALYSIS: THE "ZERO EMISSIONS ENERGY ALTERNATIVE"

The framework for conservation programs offered by both electric and natural gas utilities is based on a cost-benefit analysis called the Total Resource Cost (TRC) test. Under this framework, the lifetime savings from avoided electricity or gas supply costs (discounted on a present value basis) must exceed the incremental capital cost of the conservation initiative in order for the initiative to be eligible for incentive funding.[22]

Unfortunately, the value of avoided greenhouse gas emissions is given no weight in this accounting framework. This is a particularly significant problem for energy conservation initiatives that reduce the need for heating energy from natural gas, because the cost of natural gas is currently so low. Few conservation measures that reduce natural gas consumption can pass the TRC test.

One way to address this problem is to assign some value (i.e., a shadow carbon price) for avoided GHG emissions and account for this as a benefit in the cost-benefit analysis. This approach was suggested by Ontario Energy Board staff for natural gas conservation, but rejected by the Board.[23]

British Columbia recently addressed exactly this issue of how to support thermal conservation measures in light of low natural gas prices and adopted an innovative new approach.[24] Recognizing that B.C.'s emissions reductions targets essentially require almost complete decarbonization of the energy sector, B.C. took as its starting point a position whereby the cost of conservation measures should be compared not with the cost of natural gas, but with the cost of a "zero emissions energy alternative" that could realistically be an energy supply substitute for natural gas. In B.C.'s case, the chosen alternative was new carbon-free hydroelectricity. As the avoided cost was approximately double the cost of natural gas,[25] this framework essentially doubled the value of conservation, greatly expanding the list of conservation measures that were eligible for incentive funding.

2.5 ENCOURAGING CONNECTIONS THROUGH MUNICIPAL PLANNING

For a district energy system to be economically viable, it is important that most buildings within practical range of the central plant connect to the system, rather than meeting their heating and cooling needs directly from the electricity and natural gas distribution networks. If potential customers opt out of the district energy system, the fixed capital costs associated with the district energy system are spread out over a smaller customer base, often making the project more costly for customers who do connect.

When sites are being developed or redeveloped, Ontario municipalities have planning powers that can influence the establishment and growth of district energy systems and the likelihood that buildings will connect to them. Municipal official plans can express a municipality's policy preference for district energy development, and the policies in the official plan can then be applied to site-specific development approvals. Two key approvals that developers often need to seek are: (1) the plan of subdivision, to divide land into smaller ownership parcels (or its counterpart, the plan of condominium, to divide a building into individual ownership parcels); and (2) site plan control approval, whereby the municipality may impose conditions to ensure that a development is compatible with the surrounding area. Other types of approval may also be required. Developers may need to seek amendments to the municipality's official plan or zoning by-law. A newer form of approval is the development permit system, which a municipality can use to replace site plan control and zoning approval. All of these approvals are issued under the authority of the *Planning Act* (for Toronto, zoning, site plan control and development permits are covered by the *City of Toronto Act, 2006*).

These approvals can be used to encourage buildings to be built district energy-ready (i.e., able to connect to a district energy system at little additional cost to the building owner). The key technological requirements often include hydronic heating (i.e., a central heating system that utilizes hot water) within the building, adequate space within the building, and piping in a right-of-way external to the building to connect to the district energy system.[26]

Municipalities with an interest in district energy have begun to make use of their planning tools, as shown in Table 3.

Table 3: District Energy Provisions in Municipal Official Plans

Municipality	Planning Provisions Concerning District Energy	Status of District Energy Provisions in Official Plan
East Gwillimbury	**Official Plan:** Requires a feasibility study of the potential for district energy for large scale high-density developments and for developments in specified urban development areas. **Supporting Standards:** Thinking Green development standards (which apply to both plan of subdivision and site plan control applications) award points for constructing district energy systems. They also require that the necessary infrastructure and a connection to the district energy plant and system are provided if a district energy system already exists (no district energy systems exist yet in East Gwillimbury).	Adopted by municipal council and approved by higher-tier authority (York Region), but under appeal to Ontario Municipal Board
Guelph	**Official Plan:** Allows the city to identify district energy areas, and to require that new developments in these areas be built district energy-ready, along with other district energy-supportive policies.	Adopted by municipal council, not yet approved by higher-tier authority (Ministry of Municipal Affairs and Housing)
Markham	**Official Plan:** Encourages new development to connect to district energy systems. **Supporting Standards:** One of the performance measures used to evaluate development applications in the Markham Centre area is whether the building design supports the Town of Markham Energy Strategy, which includes (but is not limited to) the use of district energy.	Draft, not yet adopted by municipal council
Richmond Hill	**Official Plan:** Requires that new secondary plans investigate the feasibility of incorporating a district energy system.	In force
Toronto	**Official Plan:** No provisions related to district energy. **Supporting Standards:** The Toronto Green Standard (required for all development applications) encourages (but does not require) connection to district energy systems as one way of meeting the Green Standard's energy performance goals, for larger buildings.	Not applicable (Toronto Green Standard in use)

Most of these Ontario municipal planning requirements are quite new. The district energy policies in the official plans of Markham, Guelph and East Gwillimbury are not yet in force and could be challenged before the Ontario Municipal Board (OMB), the quasi-judicial review body to which municipal land use planning decisions can be appealed. The district energy provisions in East Gwillimbury's Official Plan are one subject of a current appeal to the OMB by several developers.[27] At the time of writing this report, the town was in negotiations with the appellants to resolve concerns and thereby preclude the need for an OMB decision on the district energy policies. Should the issue reach the OMB, the Board's decision may set an important precedent that would affect district energy policies in other municipalities.

It is useful to examine whether provincial planning legislation and policy support municipalities using their planning powers to encourage district energy, as this will influence any OMB decision on this issue.

The province clearly foresaw that municipalities could use their planning approval powers to address energy matters. When the province introduced changes to the *Planning Act* in 2006, the then-Minister of Municipal Affairs and Housing stated that

> municipalities could use site plan controls to promote innovative ideas and technologies such as green roofs, solar panels and water-conserving landscaping practices. Sustainable design elements could also be incorporated into new subdivision proposals. Municipalities could require that the design, layout and servicing of new subdivisions would need to promote energy conservation.[28]

Despite this statement, the *Planning Act* does not include any reference to energy in site plan control approvals, indicating only that these approvals can be used to address "matters relating to exterior design."[29] On the other hand, the ability to consider energy issues in reviewing draft plans of subdivision is explicit in the law: municipalities must have regard to "the extent to which the plan's design optimizes the available supply, means of supplying, efficient use and conservation of energy,"[30] although there is no reference to reducing GHG emissions.

The province can also provide clearer guidance to OMB decision making through provincial policy. The key policy expressing provincial interest in municipal planning is the Provincial Policy Statement (PPS). Planning decisions, whether made by municipalities or the OMB, must be consistent with the PPS. The current PPS expresses a provincial interest in supporting "alternative energy systems,"[31] which are defined as "sources of energy or energy conversion processes that significantly reduce the amount of harmful emissions to the environment (air, earth and water) when compared to conventional energy systems." District energy systems that would reduce GHG emissions would presumably fall within this definition. The PPS also expresses a provincial interest in supporting "renewable energy systems," but this is narrowly defined to encompass only technologies that generate electricity.

The PPS is currently under review. As part of the review process, the Canadian District Energy Association, supported by a number of stakeholder organizations and municipalities, recommended that the PPS should directly state a provincial interest in supporting district energy systems. Following stakeholder consultations, the Ministry of Municipal Affairs and Housing (MMAH) released a new draft of the PPS for comment in September 2012.

ECO Comment

The policy framework for encouraging efficient, low-carbon district energy systems in Ontario is incomplete. This reflects the general lack of interest the province has shown with regard to reducing GHG emissions from thermal energy, as opposed to electricity. The ECO offers some specific suggestions for improvement.

Financial Incentives for District Energy and GHG Reductions

The ECO believes that the Infrastructure Ontario loan program provides good support to municipalities to overcome the barrier of high initial capital costs of developing district energy systems. The ECO is also encouraged that the new regional electricity planning framework may lead the OPA to incent CHP electricity generation technologies for district energy systems in regions where these projects can add value to the electricity system.

However, additional policy interventions are needed to reward district energy choices that reduce GHG emissions. The restriction of conservation incentives to only cost-effective projects is not sufficient, on its own, to drive down emissions from building heating and to encourage energy sources other than natural gas. For the electricity sector, the government recognized this by offering additional support for renewable electricity generation technologies through the FIT program. No such incentive exists in Ontario for building heating, despite the fact that GHG emissions from building heating were more than double emissions from electricity use in 2011.[32] As noted earlier, a shadow carbon cost incorporated into the cost-benefit analysis would offer a stronger financial case for investing in district energy.

Other jurisdictions have recognized the need to incent renewable heat technologies, most notably the United Kingdom, which offers a Renewable Heat Incentive. Closer to home, Manitoba has articulated the need to move away from natural gas heating[33] and provides incentives for geoexchange heating, including larger district energy geothermal systems.

It is likely that an incentive program focused on district energy – perhaps funded by the government, not by utility ratepayers – would attract the interest of only a few municipalities in its first years, and would not impose a large cost burden on the government. However, such a program could provide a valuable boost to the growth of a low-carbon district energy industry.

It is even more important to incorporate consideration of the environmental consequences of GHG emissions into the policy decision-making process. Any incentive program should incorporate the costs associated with GHG emissions when evaluating the cost-effectiveness of energy efficiency investments like district energy. A carbon cost can be established through a pricing mechanism, or in its absence, could be incorporated into the decision-making process using an estimated (shadow) price.

Using the Municipal Planning Framework to Encourage District Energy

The ECO believes Ontario should ensure the provincial planning framework supports municipalities that wish to use their planning powers to encourage connections to low-emission district energy systems. This can be done by including language in the PPS and *Planning Act* that supports the goals of reducing energy consumption and GHG emissions in all sectors, not just electricity. This approach would not necessarily require direct references to district energy, but should be written broadly enough to encompass low-carbon district energy systems, including those that make use of renewable resources or waste heat.

The enabling framework is largely in place; however, there are a few areas where additional clarity would be desirable, by providing provincial support for municipal policies that encourage district energy connection. This would reduce appeals to the OMB of municipal district energy policies.

For example, the efficiency benefits of district energy are supported by references in the PPS to energy conservation and energy efficiency. However, the draft PPS, which has been released by MMAH for consultation, does not include any references to district energy, and would, if finalized as currently drafted, remove the reference to "alternative energy systems" in the existing PPS. The ECO believes that the PPS must clearly state the provincial interest in supporting low-emission thermal energy systems. This would give needed direction to the OMB that "renewable energy systems" must include thermal – and not just electrical – energy.

The ECO recommends that the Ministry of Municipal Affairs and Housing update the Provincial Policy Statement to support low-carbon thermal energy systems.

Second, the ECO suggests that MMAH should consider amending the *Planning Act* and supporting regulations[34] as needed to clarify that municipalities can use their approval authority over plans of subdivision, site plans and development permits to achieve the objectives of reducing energy consumption and greenhouse gas emissions.

In addition to policies supporting the development of district energy, district energy owners, including municipalities, could be granted monopoly power to deliver district energy and the OEB directed to set appropriate rates for district energy customers, similar to the Board's role in regulating rates for gas and electricity distribution. This approach is favoured by the Association of Municipalities of Ontario, which has recommended that the *Ontario Energy Board Act, 1998* be amended to allow for rate-regulated district energy utilities, which presumably would have monopoly franchises.[35] However, the ECO believes that oversight by the OEB could be detrimental to the development of district energy, and further study is warranted

before considering this approach. Ontario's gas and electric utilities are well-qualified to provide district energy services, as they do in some cases for water and sewage. The ECO encourages them to do so, but as unregulated affiliate businesses separated from their gas and electric distribution businesses.[36]

Connecting Provincial Buildings to District Energy Systems

The ECO notes that the province could be more proactive in exploring opportunities for provincially owned buildings to be district energy customers. Infrastructure Ontario alone is responsible for managing approximately 850 buildings and 50 million square feet of floor space on behalf of the province.

Cost-effective opportunities for district energy connection may arise when new buildings are constructed or when the mechanical systems in existing buildings approach their end of life. While the province has connected the Queen's Park administrative complex to Enwave's deep lake water cooling district energy system, the ECO is aware that other financially feasible opportunities to connect provincial buildings to district energy systems have not progressed.

The use of district energy would be consistent with the province's own energy-related guiding principles for government facilities, as stated in the *Green Energy Act, 2009*. These principles include planning and designing government facilities to ensure the efficient use of energy, and making environmentally and financially responsible investments in government facilities. The province's energy reduction strategies for the majority of government-owned facilities (those managed by Infrastructure Ontario) are defined and implemented through Infrastructure Ontario's Energy Master Plan, first released in 2010, and updated periodically.

The ECO recommends that the Ministry of Infrastructure direct Infrastructure Ontario to update its Energy Master Plan to assess opportunities for connecting provincial buildings to district energy systems.

3 Development Charges: Tackling Sprawl and Funding Transit

If lot size is not factored into development charges, then houses built on narrower lots pay the same charge as those on much larger lots, even though infrastructure would have to be extended further and would be more costly. If an *average-cost-per-housing-type* development charge is applied (that does not take location into account), the result is that the urban home is overcharged, and the greenfield development is subsidized, which is basically the situation in most municipalities at present.

$30,000 Development Charge $30,000

$25,000 Actual True Cost of Services $35,000

3.1 INTRODUCTION

MANY OF ONTARIO'S MUNICIPALITIES ARE GROWING, BOTH IN SIZE AND POPULATION, NECESSITATING NEW INFRASTRUCTURE AND THE EXPANSION OF SERVICES.

Municipalities can use various revenue tools to help finance the increased costs associated with new development, including property taxes, user fees and development charges. Property taxes are collected on an on-going basis from property owners based on the value of their property. User fees apply to services such as parking, swimming lessons and garbage collection and are paid only by the user of the service (though many user fees do not cover the full cost of the service and are subsidized by general revenues). Development charges (DCs) are collected from developers to help offset the one-time capital costs associated with the provision of new infrastructure. They are not paid directly by residents, although the cost is typically passed on to buyers in the purchase price of a new home. The principle underlying DCs is that growth-related development (both residential and non-residential) should pay for itself, rather than placing a financial burden on the tax base of established communities.

Development charges are an established fiscal tool for responding to growth-related pressures. But they are often overlooked as a planning tool that may influence whether growth is compact or sprawling. If compact transit-friendly communities are developed, where residents either live close to work, schools and stores or can access them via convenient public transit, then transportation-related energy consumption and greenhouse gas emissions can be reduced. If growth is sprawled and home owners require a vehicle trip to purchase a loaf of bread or take their children to a soccer game, then energy and emissions are destined to increase. This Section examines how development charges currently do, and could in the future, influence development patterns.

Background to the *Development Charges Act, 1997*

Prior to the enactment of the first *Development Charges Act* in 1989, municipalities negotiated with developers on a site-specific basis and lot levies were charged as a condition of development approval. Along with charging for on-site infrastructure (such as roads, sewer and water facilities), subdivision agreements also were used to levy charges for off-site services (both hard and soft), such as treatment plants, recreation centres and fire stations that related to a particular development. This approach, however, presented a challenge

for municipalities due to the unpredictable nature of the revenue stream that was generated. To address this issue, municipalities began to calculate municipality-wide levies, based on estimated population growth. Developers felt the municipality-wide approach improperly transferred an increased burden for financing off-site services onto their shoulders. As well, they questioned whether 'soft' services (such as administrative buildings, fire and police stations that serve the needs of the people who live in a subdivision) should legitimately be included, and maintained that levies should be restricted to those 'hard' property-related services (such as sewers and local roads) that are necessary to bring a parcel of land to market.

Both municipalities and the development community sought a legal framework that would provide consistency and certainty. Ultimately, the *Development Charges Act* was passed. Under the legislation, municipalities wishing to impose levies must pass a DC by-law outlining the manner by which charges are to be levied on new development. The legislation established the principle that site-specific negotiations are prohibited and affirmed the use of municipal-wide charges; however, the Act also permitted municipalities to establish sub-areas "where charges would be averaged on a smaller geographical basis, approximating a site-specific approach."[37] As well, municipalities were given the power to levy charges against both 'hard' property-related infrastructure, such as roads, water and sewer systems, as well as 'soft' infrastructure such as police, fire and libraries.

Following a five-year boom, the early to mid-1990s saw a weakening in the housing market that put financial pressure on the development community and restarted discussions about how municipalities and developers should share growth-related costs. Subsequently, a revised *Development Charges Act, 1997* (*DCA*) was passed, which eliminated some types of capital expenditures from the DC system (e.g., cultural and entertainment facilities, parkland acquisition, hospitals). As well, for some services including transit, municipalities were required to reduce the eligible growth-related capital costs by 10 per cent before calculating the applicable DC. For other services, such as roads, sewers, police and fire protection services, no similar reduction was required.

Development Charges Bring in Big Dollars

At present, 201 lower- and upper-tier municipalities – located primarily in the southern part of the province – have voluntarily passed DC by-laws (see Figure 2). DCs are a key revenue-raising tool for many municipalities, and the amounts raised are substantial; in 2011, $1.3 billion was collected by Ontario municipalities through this mechanism.[38] For most municipalities, DCs contribute approximately 15 per cent of the total municipal capital funding; however, for those within the Greater Toronto Area, this increases to 32 per cent. For many municipalities, DCs have increased significantly due to increased financial pressures associated with explosive growth and constrained levels of funding from senior levels of government. For municipalities within the Greater Toronto Area, the total amount of DCs charged for a single detached house (including both lower- and upper-tier municipalities where two levels exist) ranges from $19,412 to $60,883.[39] Concerns have been expressed – particularly by the building industry – that higher DCs result in increased housing prices, thus reducing affordability.

Prior to passing a DC by-law, municipalities are required to complete a background study that includes estimates of projected growth, the new services necessitated by the growth, and the net capital costs to meet these needs. Based on these estimates, each municipality then levies an amount depending on locally set rates, the type of building and, in a few instances, the location of the development. DC by-laws remain in force for a maximum of five years, following which a new background study and subsequent by-law must be passed by council in order for charges to be levied.

Lower/Single Tier Municipalities Levy Development Charges
Upper Tier Municipalities Levy Development Charges
Upper Tier/District Boundaries
Lower/Single Tier Boundaries
States / Provinces Boundaries
International Boundaries

Figure 2: Ontario Municipalities with Development Charge By-laws – 2012

Source: Ministry of Municipal Affairs and Housing (2013).

3.2 SUBSIDIZING SPRAWL?

Similar to the situation in other provinces, population growth in Ontario has occurred primarily in the large urban areas and this trend is expected to continue. The Greater Toronto Area, for example, is projected to be the fastest growing region in the province and, by 2036, is expected to account for over 51 per cent of Ontario's total population. The greatest proportion of population growth has occurred in outer suburbs in

the form of low-density, single-use development. Along with a loss of prime agricultural land, low-density suburban development has produced automobile-dependent communities and a corresponding increase in traffic-related energy consumption and GHG emissions. Within the Toronto area, for example, this type of development is 2 to 2.5 times more energy and GHG emissions intensive as high-density urban core development on a per capita basis[40] (see Figure 3). Currently, the transportation sector is responsible for the largest portion of GHG emissions in the province, and most of the future projected emissions growth – driven by urban form – is transportation related.

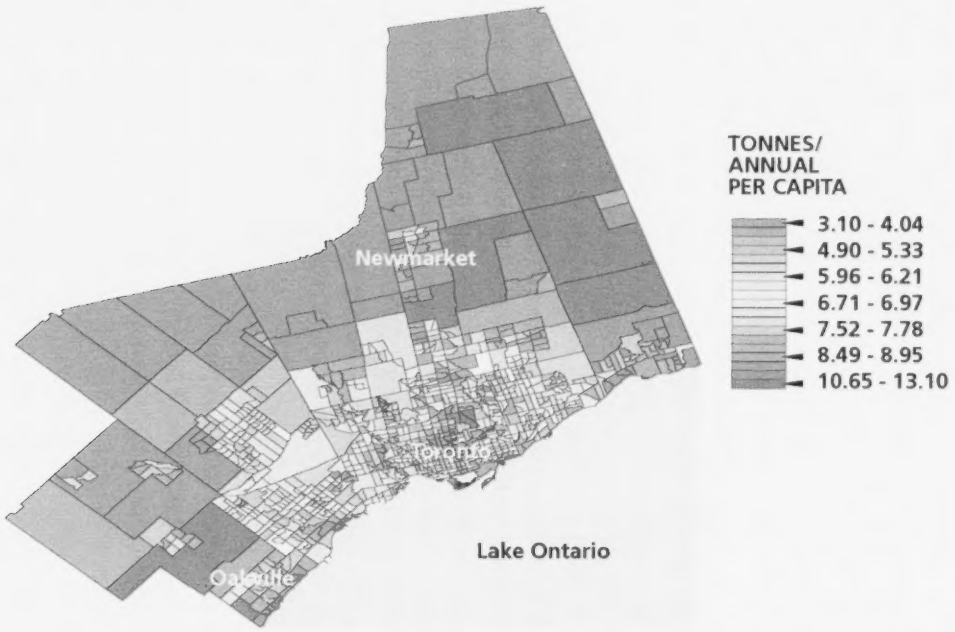


Figure 3: Annual per Capita Residential Greenhouse Gas Emissions from Total Building Operations, Electricity Use, Building Fuel Use, Transportation and Transit

Source: VandeWeghe, J. and Kennedy, C.A., "A Spatial Analysis of Residential Greenhouse Gas Emissions in the Toronto Census Metropolitan Area," *J. Industrial Ecology*, 11(2), 133-144, 2007; GetStock.com.

Over the last several years, the provincial government has attempted to shift development patterns by encouraging more intensive land use and compact forms of growth through planning policies, such as the Growth Plan for the Greater Golden Horseshoe, 2006. Under this plan, intensification and density targets were established and 25 urban growth centres were identified. Such growth management policies are important planning tools and reflect a vision of compact, mixed-use communities. This is a laudable vision given current projections of almost 12 million residents in the Greater Golden Horseshoe region by 2031.

Some urban planners and municipal finance experts have suggested that DCs are structured in a manner that undermines the growth management goals contained within provincial and municipal planning tools. They argue that municipal fiscal tools – such as DCs – could complement traditional planning tools and help shift development patterns toward more compact, mixed-use forms, but they would have to be properly structured. Given the link between urban form and energy consumption and GHG emissions, goals to reduce each of these may be undermined as well.

Implications of Using Average-cost-per-unit Development Charges

In designing a DC regime, municipalities typically have used a municipal-wide, average-cost approach, which estimates the infrastructure costs that will be required by new development within the jurisdiction. The cost is then assigned on a municipal-wide basis across all new units developed (as a charge per dwelling unit), regardless of location or the true cost of the services provided. This is problematic, given that both the density

of a development and its location has a significant influence on the costs of providing services. High-density development, and development located closer to pre-existing infrastructure, has been found to be more cost-effective than development in low-density outlying areas, particularly on a life-cycle basis.[41] This price differential is due to the fact that much of the necessary infrastructure (i.e., sidewalks, roads, and water and sewer mains) is priced on a linear distance basis.

Average-cost DCs do factor in the type of residence; single-family, detached houses are charged more than attached houses and multi-unit apartments. But if the location and density of the development is not incorporated in the DC, then areas that cost less to service will subsidize development in higher-cost areas, and denser building patterns will subsidize low-density developments. Building a new detached house in an older, urban area can utilize existing sewers, roads, water networks and other infrastructure, whereas the same house built on greenfield land will require costly new infrastructure, the initial cost of which may not be fully offset by the one-time development cost charge. This type of sprawling development results in both higher upfront and lifetime infrastructure costs for municipalities.

Similarly, if lot size is not factored into DCs, then houses built on narrower lots pay the same charge as those on much larger lots, even though infrastructure would have to be extended further and would be more costly. If an *average-cost-per-housing-type* DC is applied (that does not take location into account), the result is that the urban home is overcharged, and the greenfield development is subsidized, which is basically the situation in most municipalities at present.

Accordingly, most existing DC regimes provide a perverse financial incentive – in effect, a subsidy – for developers to build greenfield development on larger lots, the residents of which have higher energy and carbon footprints. Table 4 presents a hypothetical case where a uniform development charge is applied to each unit regardless of density.

Table 4: Impact of Uniform Development Charges

	25-foot Lot	50-foot Lot
Development Charge	$ 30,000	$ 30,000
Actual True Cost of Services	$ 25,000	$ 35,000
Over/Undercharge	**+$ 5,000**	**-$ 5,000**

Source: Adapted from Pamela Blais, *Perverse Cities: Hidden Subsidies, Wonky Policy, and Urban Sprawl* (2010).

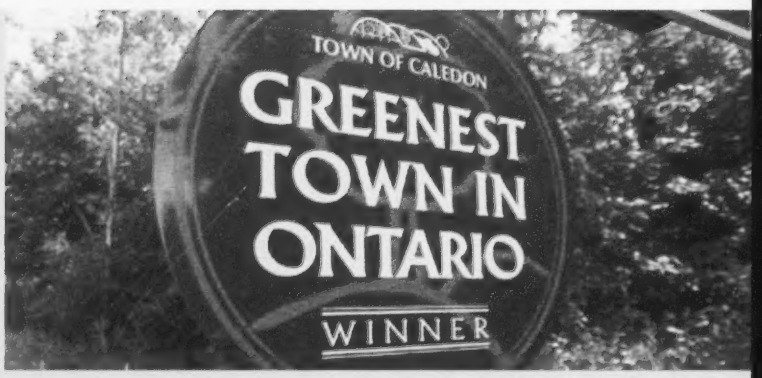
For non-residential development, the same issue arises: DCs are typically charged on a uniform per-square-metre basis (i.e., based on a building's floor area), rather than on the size of the lot on which the building is located. The fact that charges are based on floor space, rather than lot size, serves as a disincentive to denser development – the more that is built on a particular site, the higher the DC. Again, DCs that fail to reflect lot size are in effect subsidizing sprawl. This clearly runs counter to planning policies that strive to achieve dense, more compact, transit-oriented development.

Area-specific Development Charges

A second approach to calculating DCs is an *area-specific* one, where the rate charged is based on the infrastructure required by new development within a specific part of a municipality. Where municipalities recognize the advantages of existing infrastructure, they can tailor DC charges to be lower in established areas to encourage intensification and redevelopment. While most municipalities employ the municipal-wide, average-cost approach, a few have combined this with an area-specific approach. For example, the Town of Markham has identified 20 areas that have an additional area-specific charge, based on a per-net-hectare basis. Factoring location into account can be a more equitable way to reflect the true costs of services and encourage development in locations that are less costly to service.

Case Study

Using Development Charges to Incent Higher Performance Building Design



Buildings use a significant amount of energy and water. Due to a high reliance on natural gas for space and water heating, buildings are also large contributors to Ontario's GHG emissions inventory. Municipalities are required to follow the standards outlined in the Ontario Building Code (OBC). Recognizing that higher performing buildings often cost more to construct, but place a lower demand on municipal infrastructure (such as water, sewer and stormwater drainage), several municipalities are encouraging higher building performance – beyond Code – through the use of financial incentives. As permitted by subsection 5(1)10 of the *Development Charges Act, 1997*, some municipalities have chosen to reduce the development charges levied to incent such development.

In 2009, Toronto introduced the Toronto Green Standard (TGS), a two-tiered set of environmental performance measures to encourage sustainable site and building design for new development. At the time, the energy efficiency requirements of both the TGS's Tier 1 and Tier 2 developments exceeded those established under the OBC. Since then, the energy efficiency requirements of the OBC have also improved, so Toronto city council has approved an updated version. Effective January 2014, the mandatory Tier 1 standard for mid-to-high rise residential and all non-residential buildings will exceed the OBC requirements by 15 per cent, the Tier 2 standards by 25 per cent. It is estimated that these standards will reduce GHG emissions from new development in Toronto by a total of 750,000 tonnes by 2025.[42]

Along with meeting higher energy efficiency requirements, both Tier 1 and Tier 2 buildings must also meet performance measures in five core areas (including, for example, light pollution and water efficiency), as well as three other optional areas (from a list of eight options, including cycling infrastructure, stormwater retention, and the use of recycled materials). If a development meets the more stringent Tier 2 performance measures, developers are eligible for a refund of 20 per cent of the DCs paid in recognition of the decreased pressure that such developments place on city infrastructure and servicing.

Through its Green Development Program, the Town of Caledon also provides DC discounts for new commercial and industrial buildings that employ certain green technologies (such as solar hot water systems or stormwater management practices) or have been Leadership in Energy and Environmental Design (LEED) certified. For a building to be LEED certified, it must meet performance standards in the areas of sustainable site development, water efficiency, energy efficiency, material selection and indoor environmental quality. The discounts offered by Caledon range from 5 per cent to 27.5 per cent depending on the inclusion of green technologies or the level (certified, silver, gold or platinum) of LEED certification. Other municipalities, such as Burlington, have discussed the possibility of using DC exemptions to encourage more sustainable construction. However, this is not standard practice across municipalities. Taking the concept a step further, some developers have suggested that DCs associated with more sustainable building practices should be substantially reduced or entirely eliminated province-wide through an amendment to the *DCA*.

While the *DCA* grants municipalities the authority to reduce their DCs, it does not specify the grounds upon which they may do so. Other jurisdictions, such as British Columbia, have made their legislation far more explicit and have drawn a clear link between DCs and climate change mitigation. As part of its climate change policy efforts, the provincial government amended the *Local Government Act* to provide municipalities with the clear authority to waive or reduce DCs for developments that are designed to result in low GHG emissions or result in a low environmental impact.

Many factors influence where new municipal development occurs, including zoning by-laws, official plans and external market forces. But DCs do represent a substantial cost and can influence development decisions. If the effect of DCs is to subsidize low-density, location-inefficient development, then they work directly against growth management policies, such as the Growth Plan for the Greater Golden Horseshoe, 2006, which strive to achieve increased intensification. They also work against the province's GHG and energy use reduction goals. As today's growth patterns lock in future maintenance and renewal costs for infrastructure, along with future energy consumption patterns and GHG emissions, it may be timely to re-examine how DCs – a fiscal tool – can work in concert with, rather than against, the planning tools in place.

3.3 DEVELOPMENT CHARGES AND PUBLIC TRANSIT – LOOKING BACKWARD RATHER THAN FORWARD?

Walkable and transit-friendly community designs are important for reducing energy consumption and GHG emissions from the transportation sector, but good public transit also needs to be provided and financed. Ontario municipalities can use DCs to finance certain services, including public transit. The *Development Charges Act, 1997* (*DCA*) placed two restrictions on how DCs may be allocated for this service.

First, under subsection 5(1)4 of the *DCA*, a 10-year average historical service level cap exists, which means that the level of transit service funded through any DC cannot exceed the average service level provided over the previous 10 years. This restriction replaced the peak service level rule, which allowed municipalities to levy DCs that would fund services at a level up to the highest service level standards attained in the previous 10 years. As recently pointed out by the Region of Waterloo, the service level restriction prevents municipalities from "recovering the growth-related costs of significant improvements in transit service levels – such as implementing a rapid transit system ... despite the fact that much of the need for rapid transit is driven by anticipated population and employment growth."[43]

The second restriction requires municipalities to apply a mandatory 10 per cent reduction to the growth-related net capital costs for transit prior to calculating the charge. In contrast, they are permitted to recover up to 100 per cent of the growth-related net capital costs for several other services, including roads, water and wastewater, stormwater management, and police and fire services. Brampton, for example, estimated that the discount reduced funding for transit by $42 million between 2004 and 2009 – an amount that had to be covered by general revenue.[44] In Ottawa, it resulted in $26 million that had to be funded out of general revenues between 2004 and 2007.[45]

One glaring example of how the current DC restrictions limit transit funding, and required the provincial government to exempt a transit project from existing statutory provisions in order for the project to proceed, is described in the case study on page 33.

Concerns have been expressed by municipalities and others about the impact of these restrictions on improving or expanding public transit and whether they undermine efforts to develop more transit-oriented communities. During the ECO's consultation with municipalities for this report, these statutory limitations were specifically identified as a key barrier for municipalities wishing to enhance their public transit systems. This is a particular challenge especially given that many systems across the province are experiencing strong growth in ridership levels. For those municipalities that have not previously had public transit systems, these provisions have been cited as a funding barrier.

The Ontario Professional Planners Institute also has argued that the legislation, by restricting future transit services to past service levels, results in insufficient transit funding "to accommodate the increased population and employment levels being approved and planned."[46] [47] Metrolinx, in its recently released Investment Strategy, echoes this sentiment and is calling for reform of the *DCA* to remove the 10 per cent discount and the 10-year historical cap in order to "expand the ability of municipalities to use development charges to raise revenues for transit."[48] In conjunction with a proposed increase in DCs across the Greater Toronto and Hamilton Area, Metrolinx estimates that $100 million per year by 2021 would be generated in dedicated funding for transit projects.[49]

These concerns are not new. Seven years ago, the province initiated a review of provincial-municipal services and the manner by which infrastructure and public programs are funded and delivered. As part of that review, a Development Charges Subgroup was tasked with reviewing the *DCA* and providing options that would further support the underlying principle that "growth pays for growth." The subgroup identified four priority areas for possible change, including the mandatory 10 per cent discount requirement for transit and the service level calculation.

The subgroup pointed out that the discount provisions have some unintended consequences. For instance, the *DCA* prohibits the combining of monies collected for services that are 100 per cent eligible and those that are discounted. As such, roads and transit cannot be combined into a transportation service given that they reside in different categories. As the subgroup concluded, the discount requirement both creates "second class services" and

Case Study

Exemptions from Service Level Cap Help Fund Rapid Transit

The Toronto-York Spadina Subway Extension Project is an 8.6 kilometer extension of the existing Spadina subway line from Toronto north into York Region. Along with funding provided by the federal and provincial governments, Toronto and York Region are also contributing to the project. In December 2006, the provincial government amended the *Development Charges Act, 1997* to exempt this project from both the 10-year historical service-level average restriction, as well as the 10 per cent reduction of net capital costs requirement. According to a recent report conducted for the City of Toronto, more than $300 million of Toronto's portion of the Spadina extension is eligible for funding through the DC mechanism,[50] an amount that is presumably much higher than it would have been if no amendment were made.

More recently, the Region of Waterloo has requested a similar exemption to allow it to calculate its development charges on future, rather than historic, service levels in order to help fund a rapid transit project.

serves "as a barrier to integrated financial planning for transportation, which can lead to the overbuilding of roads at the expense of transit, as a greater portion of the capital costs of roads can be recovered"[51] through DCs. Options proposed to remedy this included both reconsidering whether some services (i.e., transit) should continue to be discounted, and removing the discount provision altogether.

With regard to the 10-year average service level restriction, the subgroup observed that it may have a negative impact on the ability of municipalities to meet strategic priorities, such as enhancing transit. As well, it was argued that the restriction may be "at odds with smart growth principles ... and political direction towards 'complete communities'."[52] Various alternatives to address these concerns were outlined including:

- reverting back to 10-year peak service levels;
- replacing the 10-year average service level with a forward-looking service level standard;
- allowing provincially-defined service level standards to supersede the 10-year average level; and
- removing the service levels standard requirement.

Following the review process, however, no consensus was reached on reforming the *DCA*.

ECO Comment

Role of the Provincial Government in Providing DC Guidance

While it is clearly within the purview of municipalities to establish their own DC by-laws, the provincial government could provide more guidance. British Columbia's Best Practices Guide, for example, urges municipalities to ensure that their DC by-laws serve the broader goals of a community and reflect other initiatives, including the goals established in other provincial legislation, regional growth strategies and official community plans. As the B.C. Best Practices Guide points out, DCs are "only one element of a municipality's approach in dealing with issues of land efficiency ... and community sustainability."[53]

Just as the Ontario Ministry of Municipal Affairs and Housing has provided guidance and examples of best practices on how land use planning decisions can impact public health, the province could similarly direct and guide municipalities on the role that fiscal tools, such as DCs, can play in encouraging smart growth or energy-efficient development. The use of DCs to incent low-impact development, such as done by Toronto and Caledon, may serve as a best practice. Provincial guidance may help reduce any municipal hesitancy to use such tools. This may prove to be of particular value for those municipalities in which planning departments are not given a significant role in the design of the DC program, and where DC fee structures may be effectively undermining the municipality's land use planning objectives and policies.

The ECO recommends that the Ministry of Municipal Affairs and Housing produce a best practices guide that outlines how development charges can be used to encourage more compact and sustainable communities.

In the past, the ECO has called for greater transparency for consumers through home energy labeling.[54] Similar transparency on DCs may also help prospective homebuyers. Assuming that an area-specific DC approach is used that more properly reflects the true costs of development, making the cost of the DC levy transparent would help homebuyers see the financial implications associated with the location of their home relative to existing municipal services. Currently, DCs are hidden in the price paid for a property. Just as home energy labels would provide a market signal to encourage investment in building stock efficiency, making the cost of DCs explicit would provide a market signal as to the truer costs associated with various forms of development.

Amending the *DCA* to Better Support Rapid Transit

The ECO recognizes that finding the money necessary to further expand public transit infrastructure is a challenging and complex issue and that no silver bullet solution exists. Many tools will be needed to raise the necessary funds, and reform of the *DCA* to allow municipalities greater transit funding is only one of many possible revenue sources. Nevertheless, it is one that should be given serious consideration by the provincial government; both the 10 per cent discount and the historic 10-year average service level standard should be closely examined and changed. The example, noted above, where the government offered an exemption from the 10-year averaging and 10 per cent reduction rules is essentially an admission that the current framework is flawed and must be amended.

In this regard, the ECO is struck by the different treatment that is afforded public transit versus roads within the *DCA*. Under the current provisions, a municipality that is struggling to address severe traffic congestion and air emissions, but has historically limited transit service, will be constrained in its ability to use DCs to make critical transit improvements. On the other hand, the same municipality is fully able to use DC funds to invest in new roads that potentially work in opposition to its planning goals. Under the current rules, it seems to the ECO that public transit is treated inequitably, despite the clear benefits it provides in addressing traffic congestion, thereby reducing air pollution and GHG emissions.

In January 2012, the Ministry of Transportation updated the province's Transit-Supportive Guidelines, which are designed to provide municipalities with tools and best practices as they work to develop more transit-supportive communities. Clearly, there is a desire on the part of the provincial government to guide municipalities along this path. Looking at the potential for DCs to help finance such improved and expanded transit would be a step in the right direction.

The ECO recommends that the Ministry of Municipal Affairs and Housing amend the *Development Charges Act, 1997* to expand the ability of municipalities to fund growth-related public transit services through development charges.

4 Measuring Municipal Energy Consumption: Progress in Implementing O. Reg. 397/11

The City of Ottawa's first energy consumption report highlights some of the unique information that can be obtained through O. Reg. 397/11. In 2011, Ottawa's 242 municipal facilities comprised almost 9 million square feet and consumed approximately 204 gigawatt-hours of electricity and 14.6 million cubic meters of natural gas. About one-third of the total electricity consumed was used to pump the city's water or treat its sewage, while a significant amount of natural gas was used by vehicle maintenance, repair and storage facilities.

The City of Ottawa's Electricity Usage

4 MEASURING MUNICIPAL ENERGY CONSUMPTION: PROGRESS IN IMPLEMENTING O. REG. 397/11

IF WE EVER HOPE TO REDUCE OUR ENERGY CONSUMPTION IN A COMPREHENSIVE AND EFFECTIVE MANNER, WE MUST FIRST BE ABLE TO MEASURE WHERE AND HOW WE USE THAT ENERGY.

The provincial government made a commitment in 2009 to help public agencies, including municipalities, better manage their energy consumption. In January 2012, O. Reg. 397/11- Energy Conservation and Demand Management Plans, made under the *Green Energy Act, 2009,* came into force. Under this regulation, every public hospital, school board, post-secondary educational institute, municipality and municipal service board is required to publicly report energy consumption and greenhouse gas (GHG) emissions, and to develop energy conservation plans. Instead of using heavy-handed, prescriptive requirements forcing municipalities to improve the energy efficiency of buildings or perform system upgrades, these energy reports let municipalities discover for themselves how their buildings are performing and identify opportunities for improvement. Other North American jurisdictions (e.g., New York City, Seattle, San Francisco and Boston) have similar reporting rules to help manage energy consumption.

This Section provides an update on how Ontario's reporting rules are working. For an overview of the regulation, and the ECO's recommendations for increasing its scope, see Section 5 of the ECO's Annual Energy Progress Report 2011 (Volume One).

4.1 EXPANDING OUR KNOWLEDGE BASE

Municipalities are required to do two things under O. Reg. 397/11. First, they must produce an annual energy consumption and GHG emissions report for designated municipal facilities, such as public libraries, parking garages and fire stations. The first reports were due July 1, 2013 and contained information for energy used during the 2011 calendar year. The second requirement is to prepare five-year energy conservation and demand management plans. The first conservation plans are due July 1, 2014 and must be updated every five years. Taken together, these two requirements will produce valuable energy usage data that otherwise would not be available.

One might assume municipalities already have ready access to this energy consumption data. After all, each municipality receives regular invoices for the energy it uses and must pay these bills. However, the offices responsible for processing the payments may not track these expenditures in a format that illustrates energy use by operation type. Unlike a residential user who receives energy bills and makes energy-saving decisions based on these bills, the municipal offices responsible for paying energy invoices may not be the same ones responsible for making energy consumption decisions.

So how much energy do Ontario municipalities use? The short answer is "a lot." A 2008 survey of electricity consumption showed that Ontario's more than 400 municipalities maintained approximately 26,000 different

Photo by: Christine Lee, The Malton Mirror

accounts that showed a cumulative total of more than 6.6 billion kilowatt-hours of electricity were used in just one year.[55] This represented 4.3 per cent of total provincial consumption and cost $680 million. Municipalities not only use a lot of electricity, they also consume large amounts of natural gas.[56] In order to make the best choices when investing in energy efficiency improvements, municipalities must determine how and where energy is used within their operations.

4.2 THE FIRST MUNICIPAL ENERGY REPORTS

Ontario Regulation 397/11 requires that municipalities use a template provided by the Ministry of Energy to submit their energy consumption and GHG emissions reports. In 2011, the ministry created a draft template and told the ECO that it was developing an on-line database so reports could be submitted electronically.[57] After consulting on the draft template and database, the ministry released the final template and supporting resources through an on-line portal on April 15, 2013 — just two-and-a-half months before the July 1 deadline for the first reports.[58] In addition, a series of webinars explaining how to use the electronic reporting template were held in late April.

By July 2014, public agencies will be required to publish their conservation and demand management plans. As required by the regulation, these plans must outline energy conservation goals and objectives, proposed conservation measures, estimated costs and benefits, and any renewable energy installations. In response to information requested by the ECO, the Ministry of Energy indicated that it intends to finalize a guidance document for this process by the fall of 2013, which would give municipalities about six months to prepare for the July 2014 submission deadline.[59]

Collecting Clear and Accurate Data

Municipalities are able to track energy use within their facilities by reviewing their energy bills. With thousands of separate utility accounts across this sector, a key challenge is ensuring that accurate information is collected from these bills.

Simple, easy-to-read bills can help ensure that the data collected are correct. However, Ontario does not have requirements in place for how electricity billing information must be displayed on the bills of large-volume consumers. These bills often show both *metered* and *adjusted* consumption values, which differ by about five per cent and can make reporting confusing. *Metered* consumption indicates the amount of electricity used within a facility, whereas *adjusted* consumption also includes the amount of electricity lost during the delivery

process. With respect to municipal energy reports, it is the *metered* consumption data that must be submitted to the ministry.

Ontario does have certain requirements on how information must be displayed on the electricity bills of low-volume consumers, such as those received by homeowners.[60] These bills must clearly show the amount of electricity consumed as a separate value, while any electricity lost during delivery must be included as part of a separate delivery charge. These bills are also required to provide historical information to allow consumers to easily review their electricity consumption over time.

Manual keystroke errors can also introduce inaccuracies in the energy reports, as the calculators and templates developed by the Ministry of Energy cannot detect if an entry is inaccurate.[61] In the future, the ministry intends to look more closely at reporting difficulties that arise in this year's submissions.

Determining Energy Use by Operation Type

Municipalities must report their energy consumption for each building by operation type (e.g., if a facility is a parking garage, public library, art gallery, community centre, etc.), and must include the total floor area of the operation. Determining the energy consumed by each operation is straight forward if it has its own dedicated sub-meter or meter. But problems may arise when facilities in different operational categories share the same electricity and/or gas meters. In such circumstances, a municipality must use the methodology and formula prepared by the Ministry of Energy to determine the energy used by each operation.[62] Once calculated, this value is inserted into the reporting template. The template does not record if the data is derived from a single or shared meter, nor does it record the type of calculation performed. This will make it difficult to ensure future analyses of the data make an apples-to-apples comparison.

4.2.1 BETTER BUILDINGS WIRELESS METER CHALLENGE

While real-time metering for entire buildings or facilities already occurs, sub-metering of various operations and equipment is typically not available because of the high costs associated with the purchase of the necessary metering equipment and its installation. Thus, many building managers are unable to access this more detailed information.

The U.S. Department of Energy recognized this issue and launched its Low-Cost Wireless Meter Challenge on May 30, 2013.[63] The department is challenging industry to produce a $100 wireless sub-metering system that can measure energy use at various locations within a building. While the sub-metering systems themselves do not improve energy efficiency, they allow greater information to be collected regarding energy use in a building. Energy use (and bills) can then be reduced by a prudent building manager. The U.S. Department of Energy estimates that this type of sub-metering could save at least 2 per cent of annual energy consumption.

In addition to producing a sub-metering system that costs a fraction of the current price, one of the desired outcomes of the challenge is to support government and private sector commercial building energy efficiency improvements, like New York City's requirement to annually publish data on energy and water use for large buildings. If successful, innovative low-cost technologies like this will no doubt benefit Ontario's broader public sector as it continues to collect energy consumption data.

Public Access to Collected Data

Municipalities must make their energy reports available to the public in printed form and on their websites by July 1 of each year, which is the same deadline by which reports must be submitted to the ministry. Each report must remain available to the public for at least a year, until the subsequent year's edition is posted. The Ministry of Energy's regulatory guidance document, however, encourages organizations to make their reports available to the public on an ongoing basis, to allow tracking of the progress made in meeting energy conservation targets.

The Ministry of Energy told the ECO that it intends to post information on-line describing the results from this first data reporting milestone, and that it also will provide a central location for the public to access the reported data.[64] The ministry may work with a third party to conduct a more in-depth analysis. For example, the third party could normalize the data for weather, compare or rate operations against one another,

identify the best performing facilities and produce case studies. The third party could also identify potential conservation opportunities by sector.

Compliance with the Regulation

As of July 23, 2013, approximately 94 per cent of Ontario's municipalities submitted their energy reports to the Ministry of Energy.[65] Going forward, the ministry will review the submitted reports and overall compliance with O. Reg. 397/11.[66] The results from this reporting cycle will be used to consider improvements to the regulation and/or reporting template.

Case Study

Highlights from Ottawa's Energy Report

The City of Ottawa's first energy consumption report highlights some of the unique information that can be obtained through this reporting initiative.[67] In 2011, Ottawa's 242 municipal facilities comprised almost 9 million square feet and consumed approximately 204 gigawatt-hours of electricity and 14.6 million cubic meters of natural gas. About one-third of the total electricity consumed was used to pump the city's water or treat its sewage, while a significant amount of natural gas was used by vehicle maintenance, repair and storage facilities. Some of the other facility categories consuming the greatest amounts of energy are highlighted in the attached table.

Table 5: Ottawa's Energy Use by Facility Type

Facility Type	Electricity (GWh)	Share of Total	Natural Gas (million m^3)	Share of Total	Estimated GHG Emissions (kilotonnes of CO_2e)
Water pumping and sewage treatment	69.7	34%	1.6	11%	8.7
Indoor recreational facilities	31.8	16%	2.3	16%	6.9
Vehicle maintenance, repair and storage	24.4	12%	5.5	38%	12.4
Administrative offices and related facilities	21.7	11%	1.0	7%	3.6
Community centres	9.0	4%	1.0	7%	2.6
Subtotal	**156.7**	**77%**	**11.4**	**78%**	**34.2**
Total (including other municipal facilities)	**204.3**	**100%**	**14.6**	**100%**	-

It must be noted that while Ottawa should have provided information on its greenhouse gas emissions, the city did not include this information in its on-line report. The above estimates of GHG emissions were calculated by ECO staff using the Ministry of Energy's reporting template. At the time of writing, the reports from some municipalities were difficult to locate on-line, were missing information, or showed evidence of other (relatively minor) reporting issues.

ECO Comment

Provide Timely Guidance Documents

The ECO is concerned with the late release of guidance documents needed to complete the first energy consumption and GHG emissions reports. Although O. Reg. 397/11 was filed in August 2011 and came into force in January 2012, the Ministry of Energy provided municipalities (and other broader public sector agencies) with the required template and guidance documents just 2.5 months before the energy reports were due.

In March 2013, and shortly before the final template and guidance documents were released, the ECO spoke with various municipalities about the reporting requirements (see Section 1.3.1 of this report). At the time, municipalities indicated that the collection of billing data from utilities was onerous and required a significant time commitment by municipal staff. They also noted that they were preparing for the July 1, 2013 deadline without any formal guidance from the ministry. In addition, municipalities expressed concerns about the usefulness of the collected utility data in preparing future energy conservation plans, since specific details of the plan requirements were unknown and would not likely be known for some time. Overall, these uncertainties placed an unnecessary stress on municipal governments.

The Ministry of Energy needs to provide both municipalities and the broader public sector with the tools needed to develop their conservation plans well in advance of the July 2014 deadline. Ontario Regulation 397/11 requires that conservation plans include information on the amount of renewable energy produced and the amount of energy expected to be saved through conservation measures. Guidelines from the ministry would be helpful in ensuring that municipalities (and other broader public sector organizations) report this information in a consistent manner that allows for comparisons across organizations. The ECO suggests that the Ministry of Energy produce a guidance document that outlines specific requirements for the broader public sector's energy conservation plans by December 31, 2013.

Large Consumers Need Clear Billing Information

Accurate data collection under O. Reg. 397/11 is the paramount goal, since this information will be used to identify the best opportunities for improving energy efficiency, set benchmarks, and serve as the basis for subsequent five-year energy conservation and demand management plans.

Electricity bills often display both metered and adjusted consumption amounts. The metered value represents the amount of electricity that is actually used in a facility, and this is the value that must be recorded and reported under O. Reg. 397/11. The Ministry of Energy should ensure that electricity bills for large-volume consumers prominently display metered amounts. Ultimately, this will help municipalities assemble robust datasets that can be used to target facilities with the greatest energy conservation potential. As is done for low-volume consumers, the amount of electricity lost during delivery could be reflected as a delivery charge.

The ECO suggests that the Ministry of Energy and the Ontario Energy Board work with distributors and consumers to ensure billing information is displayed clearly and consistently. They could develop guidelines for billing displays for both distributors and electricity retailers.[68] A consistent billing presentation format is already required for low-volume consumers; however, no such requirements exist for larger consumers. The need to prominently display and identify metered consumption would be one element of the guidelines. Furthermore, the ECO believes the guidelines could also recommend year-over-year consumption comparisons and other tools to help consumers better understand their energy usage patterns.

Accuracy Issues

The ECO is generally pleased with the template and calculators designed for municipal energy usage reporting; however, these tools are unable to detect inaccurate data.

The ministry's template also should record if the data entries are based on information from a single or a shared utility meter. Since data from a shared meter requires additional calculations to estimate a facility's energy consumption, the data is not as accurate as data that is collected from a single meter (or sub-meter). Therefore, having this information recorded will improve the overall quality of data analyses and benchmark

setting. If the data entries are from a shared meter, the template should also record which calculation methodology was used.

Sub-metering can enhance overall accuracy; providing each facility with its own individual meter would eliminate the need to perform calculations on shared meters. Hopefully, with efforts like the U.S. Department of Energy's Low-Cost Wireless Meter Challenge, sub-metering systems will become more cost effective.

Public Access to Collected Data

Ontario Regulation 397/11 requires energy reports be available to the public, in hard copy and on the Internet, for at least a year, until the following year's report is made available. The ECO believes that this regulation should be changed to require that all reports be available to the public with records maintained indefinitely. Since this information may be difficult for the public to find, or may not be displayed consistently on municipal websites (as discussed on page 41), the Ministry of Energy should host all filed energy reports in a central Internet location, to facilitate public access and comparisons.

The ECO recommends that the Ministry of Energy make all energy reports and plans it receives from the broader public sector permanently available on its website in a consistent format.

The ECO is pleased that the Ministry of Energy plans to analyze the collected information. This analysis should be made available to the public as soon as possible, since it will help municipalities create energy conservation and demand management plans. Ideally, the analysis would also compare the energy performance of the broader public sector with buildings and operations owned or operated by the provincial government, which are subject to different reporting requirements.[69]

Compliance with the Regulation

The municipal sector has the potential to deliver substantial energy savings and significant

Case Study

York Region's Water Conservation and Efficiency Program

York Region is an upper-tier regional government immediately north of Toronto. It is responsible for providing water and wastewater services to its nine lower-tier municipalities with a population of about 1.1 million.[70] Operation of its water and wastewater facilities represents nearly two-thirds of the municipal corporation's annual electricity consumption. The major challenge for the region is access to a large body of water for water withdrawal or wastewater treatment. York must pump water from Lake Ontario through an extension of the City of Toronto and Region of Peel water supply systems.

With an expected 50 per cent growth in population over the next 20 years, York Region launched its Water for Tomorrow program in 1998 – a comprehensive program with a focus on education of why water efficiency is important. In 2006, as part of this effort, the region stipulated that all new regional facilities "be constructed to a minimum level of LEED Silver as a way of addressing water efficiency."[71] The region successfully worked with its lower-tier member municipalities in support of summer lawn watering conservation by-laws and a low-flow toilet rebate program. After establishing a link between water and energy demand, the region has monitored energy and GHGs saved. The region reports it is saving 20 million litres of water per day and is avoiding the release of over 21,000 tonnes of GHGs per year.

environmental benefits to all Ontarians. The ECO commends the Ministry of Energy for ensuring a high level of municipal energy reporting under O. Reg. 397/11.[72] As the ministry reviews the submitted reports, it will determine the exact level of compliance (e.g., reviewing filed reports for data completeness) and be able to consider improvements to the regulation and reporting template based on experiences from the first report submissions.

The ECO is pleased with the work to date in implementing O. Reg. 397/11 and views it as a significant step toward reducing energy consumption and improving energy efficiencies in the municipal sector.

The energy reports will bring energy purchases into the spotlight, raise municipal awareness of the energy consumed by different operations, and identify buildings and operations that are particularly poor energy performers. Knowing how much and where energy is used will help municipalities increase their overall energy efficiency. The Ministry of Energy's commitment to continue to improve the regulation and templates is a positive step, and the ECO encourages the ministry to make any necessary adjustments.

5 Retrofitting Buildings Using Local Improvement Charges

As of 2006, 78% of Ontario residential housing stock was built before 1990, when energy efficiency requirements were first added to the Ontario Building Code.

Many of these older buildings require excessive amounts of energy to heat and cool and are ideal candidates for energy retrofits.

78% of Ontario residential housing stock are ideal candidates for energy retrofits

5.1 INTRODUCTION

> MANY OLDER BUILDINGS ARE DRAUGHTY AND POORLY INSULATED, REQUIRING EXCESSIVE AMOUNTS OF ENERGY TO HEAT AND COOL AND PROVIDING POOR COMFORT TO OCCUPANTS.

The reason for this is that prior to 1990 the Ontario Building Code included no energy efficiency requirements at all. Since then, energy standards for new buildings have been improved and made more rigorous. However, these Code improvements do not address the large number of inefficient older buildings.

From April 2007 to March 2011, the Ontario Home Energy Savings Program offered grants to encourage homeowners to improve the energy efficiency of existing residential buildings.[73] This funding was complemented by additional incentives from the federal government. However, both the provincial and federal programs have been cancelled, and these programs appear unlikely to return. Absent a provincial grant program, some municipalities hope to expand the use of an existing municipal revenue tool, the local improvement charge (LIC), to finance building retrofits.

LICs are used by municipalities to recover the costs of municipal capital projects from those specific property owners that benefit from the project (as opposed to recovering the costs from all residents through property taxes). Ontario municipalities have the authority under the *Municipal Act, 2001* (through O. Reg. 586/06) and the City of Toronto under the *City of Toronto Act, 2006* (through O. Reg. 596/06) to pass a by-law that adds the LIC as an additional charge on each affected owner's property tax bill. The LIC is collected each instalment period until the project cost is paid off. If a property with an LIC is sold, the obligation to pay the remaining balance of the LIC falls to the new owner.

The traditional use of LICs has been to fund public infrastructure works on property outside of the home that would benefit multiple owners, such as sidewalks, speed bumps and sewers. In 2008, 25 per cent of Ontario municipalities used LICs for these purposes.[74] However, several stakeholders, particularly the David Suzuki Foundation, have suggested that LICs could fund capital investments on private property within a home or building, in effect acting as a loan to the property owner and using the property tax administrative system to recover the loan.[75] Municipalities interested in reducing energy consumption or greenhouse gas emissions could use LICs to fund actions by the property owner to improve a building's energy efficiency or make use of renewable energy. Since all costs would be recovered from participating property owners, there would be no net financial impact on the municipality or other municipal taxpayers.

The LIC offers several benefits in comparison with other financing mechanisms that a property owner might use to fund energy efficiency investments. Financing can be made available to property owners of all incomes and mortgage amounts, including those that might need to pay premium interest rates to obtain a loan from a private lender. Municipalities are protected from default by the property lien attached to an LIC, so they may be able to offer financing through the LIC at lower interest rates than other financing options. In addition, LIC financing may be more attractive to owners who intend to sell the property in the near term, and might otherwise be unwilling to make a large investment in a retrofit. The reason for this is that the LIC debt is tied to the property, not personally to the property owner, and any outstanding debt is assumed by the new owner upon transfer of the property.

A similar approach to LICs, known as Property Assessed Clean Energy (PACE), was first launched in Berkeley, California, in 2008, and the idea attracted interest across the United States. Twenty-eight states have passed enabling legislation for local governments to offer PACE benefits to building owners. However, concerns by

the U.S. Federal Housing Finance Agency as to how PACE loans may impact the default risk for mortgage lenders have since led to a freeze on many U.S. PACE programs in the residential sector.

In Canada, the use of LIC financing for energy programs is relatively new. Halifax, Nova Scotia, has recently launched an LIC-style program focused exclusively on solar hot water heating. Within a few months of launch, the program is already fully subscribed, with 1,600 homeowners expressing an interest in participating. However, a more comprehensive pilot energy retrofit loan program in Vancouver, British Columbia, attracted little interest from homeowners and was cancelled.

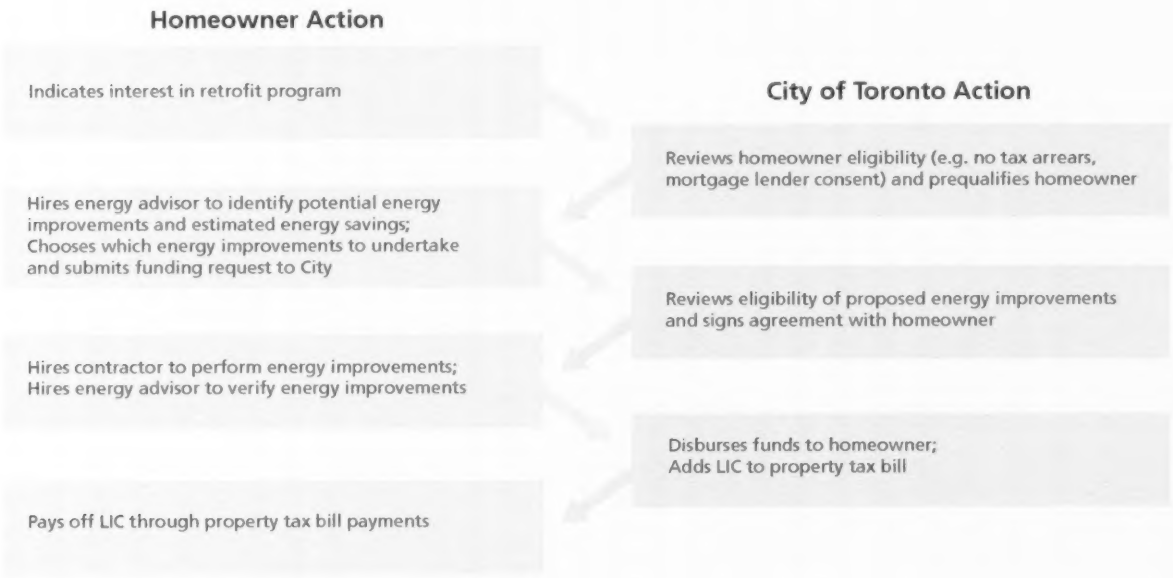

Homeowner Action
Indicates interest in retrofit program
Hires energy advisor to identify potential energy improvements and estimated energy savings; Chooses which energy improvements to undertake and submits funding request to City
Hires contractor to perform energy improvements; Hires energy advisor to verify energy improvements
Pays off LIC through property tax bill payments
City of Toronto Action
Reviews homeowner eligibility (e.g. no tax arrears, mortgage lender consent) and prequalifies homeowner
Reviews eligibility of proposed energy improvements and signs agreement with homeowner
Disburses funds to homeowner; Adds LIC to property tax bill

Figure 4: Proposed City of Toronto LIC Retrofit Program Model for Single-Family Housing

Source: City of Toronto

5.2 REGULATORY CHANGES IN ONTARIO

Until 2012, uncertainty existed as to whether municipalities could use LICs to fund projects on private property. In addition, the rules were intended for public works projects where multiple owners would be charged. The regulatory procedures in O. Reg. 586/06 and O. Reg. 596/06 required that charges be based on lot frontage and that a committee hold public hearings. These requirements were inappropriate and overly complex for projects on private property where an LIC would only be imposed with the consent of the property owner.

In January 2012, Ontario residents used the *Environmental Bill of Rights, 1993* to request a review of LICs. Their application requested that the Ministry of Municipal Affairs and Housing (MMAH) review the existing policies, legislation and regulations relating to the use of LICs to enable energy improvements on private property, focusing primarily on the issues with O. Reg. 586/06 and O. Reg. 596/06.[76] The Association of Municipalities of Ontario also sent a letter to MMAH, agreeing that changes to these regulations were needed. MMAH denied the Application for Review but commented that it was already undertaking a review of the LIC regulations and would be considering these issues.

In October 2012, MMAH took action and amended O. Reg. 586/06 and O. Reg. 596/06. The key changes relevant to energy improvements on private property are as follows:

- Municipalities are explicitly authorized to use LICs for projects on private property, including for the benefit of a single lot, and given the authority to impose special charges on that lot, if the property owner gives consent (the procedural requirements for issuing LICs of this nature are greatly simplified).

- Energy efficiency, renewable energy and water conservation are named as examples of LIC-eligible capital projects.
- Municipalities are authorized to pass a general by-law to enable multiple LIC projects that satisfy the requirements of a municipal program (rather than needing to pass a separate by-law for each specific LIC project).

These amendments largely address the concerns raised in the Application for Review and open the door for municipalities to use LICs to launch programs that fund private property investments, including energy retrofit programs. The regulatory amendments enable municipalities but don't provide guidance on technical and financial implementation.

Interestingly, in a July 2013 discussion paper, Conservation First: A Renewed Vision for Energy Conservation in Ontario,[77] the Ministry of Energy noted the possibility of introducing several alternative financing mechanisms for energy retrofits that would not directly involve municipalities. The two mechanisms are (1) on-bill financing through energy utilities, and (2) a provincial revolving fund that property owners could access for loans. The Ministry of Energy has not committed to implementing either of these approaches.

5.3 MUNICIPAL INTEREST IN IMPLEMENTING ENERGY RETROFIT PROGRAMS

Encouragingly, municipalities have shown substantial interest in developing LIC-based energy retrofit programs in the months since the regulatory amendments came into force on October 25, 2012. Much of the initial work has been undertaken by the Collaboration on Home Energy Efficiency Retrofits in Ontario (CHEERIO), initiated by the Toronto Atmospheric Fund and co-ordinated by the Clean Air Partnership. The Ministry of Energy and the Ontario Power Authority (OPA) have provided financial support, as have Enbridge Gas and several Ontario municipalities. Twenty-two Ontario municipalities are participating in CHEERIO, pooling resources and avoiding the duplication typical of early-stage efforts to develop their own programs. Most participating municipalities are interested primarily in retrofit programs for single-family low-rise housing, although a few also are interested in multi-residential buildings.

The goal of CHEERIO is to design a deep energy retrofit pilot program that municipalities can implement based on the LIC financing mechanism. Deep retrofits target significant energy savings – often reductions of 25 per cent or more in building energy use – and usually have a high upfront cost. Deep retrofits go beyond individual upgrades to heating and cooling systems, and include major improvements to the building envelope through insulation and air sealing. Deep retrofits are most valuable for older houses built before energy efficiency standards were added to the Ontario Building Code.

Case Study

Toronto Pilot Retrofit Program

The City of Toronto has been first out of the gate in using LICs for energy efficiency improvements on private property. On July 18, 2013, Toronto City Council approved a three-year pilot retrofit program. The program's potential to support the city's energy conservation and greenhouse gas emissions reduction targets was an important driver behind council's approval.

The program will target the retrofit of approximately 1,000 single-family homes and 10 multi-unit residential rental buildings (1,000 apartment units). For single-family homes, the program will be limited to four neighbourhoods of pre-1980 housing stock (originally built to quite low levels of energy efficiency). For multi-unit buildings, the program will target buildings built before 1984. The city will establish a reserve fund of up to $20 million for the program, taken from the existing working capital reserve fund. There will be no net operating cost to the city.

Measures eligible for funding will include natural gas, electricity and water efficiency and conservation measures: for example, insulation and air sealing, furnace and boiler upgrades, and low-flow toilets. Items not structurally attached to the property (e.g., energy-efficient appliances) will not be eligible. Only measures with the potential to be cost-effective will be eligible for financing.

In cases where incentives are already available from gas or electric utilities' conservation programs to offset a portion of property owners' cost of improvements, the city will co-ordinate with the utilities to ensure that participants are aware of and able to collect all relevant utility incentives.

For the low-rise residential sector, Toronto has essentially replicated the operational model of Ontario's former Home Energy Savings Program. Program participants will select their own energy auditor, who must be certified by Natural Resources Canada. The energy auditor will conduct a pre-retrofit audit to identify energy-saving opportunities; a contractor (of the homeowner's choice) will do the work; and the energy auditor will return to verify that the improvements have been made. The process is similar for multi-residential buildings.

The unique aspect of the pilot is the signing of a financing agreement between the homeowner and the city prior to performing the retrofit. Subsequently, the city will advance funds to the homeowner to pay the contractor and recover the money over the years through an LIC. The interest rate that participants will be charged is still to be determined, but will be set at a rate that reflects the city's current return on investment on its reserve funds. One crucial point is that the city will require the consent of any mortgage lender as a condition of eligibility. It will be interesting to see if this proves to be a barrier to participation. If this pilot proves successful, Toronto will look to expand the program city-wide.

CHEERIO has been grappling with many program design issues, including the following.[78]

- What types of retrofit actions should be eligible for funding? Should renewable energy and water conservation measures be included? Should there be any requirement that the measures be cost-effective (for example, by reducing the owner's energy or water bills by an amount greater than or equal to their LIC installment payment)?
- Should a building energy audit by an energy professional be required to identify the measures with the greatest potential for energy savings (as was the case with the previous Home Energy Savings Program)?
- Where will municipalities obtain the seed funding that is advanced to property owners for retrofits? Is there a role for private lenders?
- What role (if any) should the municipality play in vetting the choice of contractors who would perform the retrofit work?
- How can the program best be marketed to encourage property owners to participate?
- How can the program be integrated with existing energy conservation programs and incentives delivered by gas and electric utilities?
- What degree of post-retrofit evaluation, measurement and verification is needed, in order to assess the program's effectiveness in reducing energy consumption and greenhouse gas emissions?

As the above list shows, many variables are in play that could affect the success of a municipal retrofit program. The CHEERIO effort should be useful in producing a retrofit program template built on best practices, which municipalities may choose to customize based on the specific needs of their residents.

ECO Comment

The ECO is encouraged by the interest that Ontario municipalities have shown in using the LIC mechanism to fund energy improvements, and we are hopeful that more municipalities will follow Toronto's lead and launch energy retrofit programs in the future. The ECO commends MMAH for amending the regulations governing LICs to provide a clear legal framework for municipalities to use LICs to finance energy improvements. However, it should be remembered that the need for LIC-based municipal retrofit programs only arose because the province and the federal government stopped providing direct incentives for retrofits. It remains to be seen whether loan-based municipal programs will be as successful as the previous grant-based federal-provincial program in improving the efficiency of Ontario's existing building stock.

The current low price of natural gas may prove a barrier to deep retrofits, particularly if municipal programs require all retrofit actions to meet a strict definition of cost-effectiveness. Research conducted for MMAH suggests that cost-effective retrofit opportunities are quite limited. While recognizing the need to protect property owners from overextending themselves financially, the ECO encourages municipalities to assess whether a strict cost-effectiveness test should be a program requirement. Unlike utility programs that need to consider the cost to non-participating utility customers, an LIC-funded program is a contract between willing parties that has no cost to non-participants. Relaxing the cost-effectiveness requirement may allow owners who value the environmental benefits or increased comfort associated with retrofits to undertake significant retrofit measures. Of course, the cost-benefit equation would favour energy efficiency investments if there was a cost associated with GHG emissions. A carbon cost can be established through a pricing mechanism or, in its absence, could be incorporated into the decision-making process using an estimated (or shadow) price.

The remaining question is whether there is any further role for the provincial government. MMAH has indicated that it considers its role to be limited to raising municipal awareness of the regulatory amendments.[79] The Ministry of Energy has provided funding for the CHEERIO group, but has sketched out no further role.[80] The ECO has developed several suggestions as to where further provincial help could be desirable.

Seed Funding: Municipalities may need assistance in establishing an initial seed fund for loans to property owners (in time, of course, these loans to homeowners would be recovered by municipalities through the LIC payments). Halifax was successful in obtaining a loan from the federal Green Municipal Fund to establish its Solar City program, while Toronto has chosen to take funds for its pilot program from its general working capital reserve fund. However, not all municipalities will have these options (the application process for the Green Municipal Fund is competitive).

One possible funding option is the Infrastructure Ontario (IO) Loan Program, which currently provides loans to municipalities for infrastructure investments. The rates offered are usually lower than municipalities could obtain elsewhere. Municipal staff have indicated an interest in pursuing financing for a retrofit program from IO. However, it is unclear whether the IO Loan Program can be used to fund an LIC-based energy retrofit program, as the use of funds would not be for municipally owned or operated capital projects. The Ministry of Infrastructure was non-committal on this issue, stating that "Infrastructure Ontario is working with municipalities to explore how this tool [LICs for energy projects on private property] might fit with the IO Loan Program."[81]

In the ECO's view, the extension of the IO Loan Program to cover LIC projects on private property would be a positive step. In addition to providing municipalities with certainty of seed funding, the low interest rate of the IO loans would be passed on as lower overall retrofit costs to property owners, potentially attracting more program participants.

The ECO recommends that the Ministry of Infrastructure offer Infrastructure Ontario loans to municipalities as an option to facilitate home energy retrofits through local improvement charges.

Integration with gas/electric utility conservation programs: Participants in a municipal retrofit program also may be eligible for financial incentives from existing gas and electric utility conservation programs. These grants can reduce the total amount of the LIC loan and likely would entice more participants to retrofit their buildings. There are two areas where the OPA and the gas utilities potentially could improve their conservation program design to work better with any municipal retrofit programs.

The first issue is matching the timing of any utility incentive payments with the timing of the original loan taken out by the homeowner. Ideally, the timing of these processes could be co-ordinated (i.e., the incentive would arrive early enough) so that the property owner would be able to use the incentive to reduce the size of the LIC loan they need to obtain from the municipality.

The second issue is expanding the number of measures for which incentive funding is available. Many of the home retrofit conservation measures that an energy auditor might recommend, such as insulation, high-efficiency space and water heating, and air sealing, are not currently eligible for incentives even if they are cost-effective (some incentives for these measures are offered, but are restricted to low-income customers and/or certain geographic areas).[82] This is because utilities have chosen to focus their residential programs on specific measures, such as high-efficiency air conditioning and low-flow showerheads, which deliver larger energy savings in proportion to the amount of time and money invested. However, the existence of municipal retrofit programs could now allow utilities to expand the reach of program incentives, with very little additional administrative cost.

The ECO suggests that the Ontario Power Authority and the gas utilities extend program incentives to any cost-effective measures that have been recommended through a municipal retrofit program and subject to a suitable degree of verification (e.g., review by an energy auditor). The size of the incentive would be proportional to the expected amount of electricity or gas savings. A similar approach is already taken in the commercial sector, where both the gas and electric utilities offer programs (e.g., the saveONenergy business

retrofit program) with the flexibility to provide incentive funding for almost any cost-effective conservation investment.

Information Sharing: The Ontario government has done valuable work in the past that may help municipalities with the design of a municipal retrofit program. In particular, the ECO encourages the Ministry of Energy to share data and evaluation results from the Home Energy Savings Program, and MMAH to share its analysis of potential Building Code requirements for energy efficiency in renovations of existing buildings.

Home Energy Audits at Time of Sale: When the *Green Energy Act, 2009* was introduced, the Ontario government committed to require home energy audits at the time of sale of a property. This commitment has never been fulfilled.[83] Were the government to act on this promise, it would instantly increase homeowner interest in participating in a municipal retrofit program. The mandatory audit process would make clear to potential purchasers the significant difference in operating energy costs between homes that had undergone deep retrofits and similar homes that had not been retrofitted, and this information would likely become incorporated into the home's market value.

6 Endnotes

ENDNOTES

1. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2009 (Volume One): Rethinking Energy Conservation in Ontario* (Toronto, Ontario: 2010), 6, contains a full description of the reporting mandate and approach.
2. Federation of Canadian Municipalities, *Act Locally: The Municipal Role in Fighting Climate Change* (2009), 2.
3. The ECO derived the estimates in Table 1 by allocating emissions to Ontario from the Federation of Canadian Municipalities (FCM)'s estimates for Canada in its 2009 report. The emissions were allocated to Ontario using Ontario's share of Canada's total GHG emissions in 1990 and 2006 as reported in Environment Canada's 2013 and 2012 National Inventory Reports (29.9% and 27%, respectively). The ECO used the 2020 forecasts in Ontario's 2012 Climate Change Progress Report (Climate Change Action Plan policy scenario) and Environment Canada's 2012 emission trends (with existing government measures). The FCM report's 2020 forecasts are based on business as usual (BAU) but Ontario's share of Canada's emissions is almost the same in both the BAU and policy scenarios. The ECO's estimates were compared to Ontario's 1990 and 2006 GHG emissions as reported in the 2013 and 2012 National Inventory Reports. In the categories where actual reported emissions were available they were generally comparable to the ECO's estimates. Due to the lack of data availability for all emissions categories covered in Table 1, the estimates are presented for illustrative purposes only.
4. In fact, the Federation of Canadian Municipalities has reported that 59 Ontario municipalities, representing 90 per cent of Ontario's population, are members of FCM's Partners for Climate Protection (PCP) program. Nineteen of these have progressed to the action plan stage of the PCP program, targeting either their corporate operations or the community at large, or both (9 of which are Greater Toronto and Hamilton Area municipalities representing 50 per cent of the GTHA population). Federation of Canadian Municipalities, *Act Locally: The Municipal Role in Fighting Climate Change* (2009).
5. In 2007, the Ontario government committed to three GHG reduction targets: 6 per cent below 1990 levels by 2014; 15 per cent below 1990 by 2020; and 80 per cent below 1990 by 2050.
6. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2010 (Volume One): Managing a Complex Energy System* (Toronto, Ontario: 2011), 41; Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2010 (Volume Two): Managing a Complex Energy System* (Toronto, Ontario: 2011), 40.
7. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2009 (Volume One): Rethinking Energy Conservation in Ontario* (Toronto, Ontario: 2009), 18; Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2010 (Volume One): Managing a Complex Energy System* (Toronto, Ontario: 2010), 9; Environmental Commissioner of Ontario, *Annual Greenhouse Gas Progress Report: Failing Our Future* (Toronto, Ontario: 2013), 10.
8. Toronto Hydro proposed building a new transformer station, the Bremner TS, in Toronto's downtown core, in part to enable maintenance at another downtown station, and in part due to the short and mid-term need for additional capacity to serve load growth in the downtown core. Toronto Hydro requested to fund this project through distribution rates, seeking $195 million for phase 1 of the project. While Toronto Hydro did consider the potential for distributed generation and conservation policies in place to affect the load forecast, Toronto Hydro's analysis of alternatives did not specifically include the utility itself taking an active role to acquire additional distributed generation or conservation. Several intervenors, including Building Owners and Managers Association and Environmental Defence, opposed Toronto Hydro's application on these grounds. Environmental Defence suggested that the financial incentive structure encouraged Toronto Hydro to favour wires solutions. The OEB rejected these objections and approved the project. Ontario Energy Board, Partial Decision and Order, *In the Matter of the Ontario Energy Board Act, 1998, S.O. 1998, c. 15, (Schedule B); and in the*

Matter of an Application by Toronto Hydro-Electric System Limited for an Order Approving Just and Reasonable Rates and Other Charges for Electricity Distribution to be Effective June 1, 2012, May 1, 2013 and May 1, 2014, EB-2012-0064, April 2, 2013.

9. While subject to change, the proposed approach at the moment is that the OPA would have the lead in developing an "Integrated Regional Resource Plan" that would determine the preferred mix of wires, conservation and local generation. Only after this step had been taken could utilities apply to the OEB for funding for major wires investments. Ontario Energy Board Planning Process Working Group, *Planning Process Working Group Report to the Board: The Process for Regional Infrastructure Planning in Ontario* (2013), 15.

   This approach could potentially lead to financial incentives for district energy projects with a CHP component, in cases where the CHP unit would specifically eliminate the need for additional generation or transmission/distribution, giving the project a greater value to the electricity system. This new planning process would only apply to projects that are "regional" in nature (i.e., would potentially require transmission investments). The Bremner project (which was undertaken only in order to meet local distribution needs and did not have a transmission investment component) would not be subject to the new process.

10. Association of Municipalities of Ontario, *AMO's Submission to the Ontario Distribution Sector Panel* (2012), 11.

11. Ontario Ministry of Energy, "Ontario Supporting Local Energy Planning in Municipal and Aboriginal Communities," News Release, August 21, 2013.

12. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2011 (Volume Two): Restoring Balance – Results* (Toronto, Ontario: 2012), 32.

13. Independent Electricity System Operator, "Ontario's Independent Electricity System Operator Releases 2012 Electricity Production, Consumption and Price Data," News Release, January 11, 2013.

14. Hamilton Community Energy, *GHG Emission Reduction Creation Report for the Hamilton Community Energy Project for the Greening Canada Fund 2003-2009* (2009). The analysis assumes that the heating alternative to district energy would have been conventional boilers with 65% operating efficiency, and that the electricity alternative to district energy would have been the marginal generation unit on the provincial electricity grid (i.e. the generator setting the market-clearing price). For most hours, this marginal unit was fossil-fueled (either coal or gas). Going forward, fossil-fueled units will less frequently be the marginal generation unit, which will reduce the emissions reductions potential of electricity generation from CHP.

15. See Quality Urban Energy Systems of Tomorrow, *Building Smart Energy Communities: Implementing Integrated Community Energy Solutions* (2012) for an introduction to community energy planning. Quality Urban Energy Systems of Tomorrow, with the support of the Ontario Power Authority and the Ministry of Energy, is working with the Canadian Urban Institute to develop a Community Energy Planning Protocol for Ontario. Ontario municipal leaders in developing community energy plans have included the City of Guelph and the Town of East Gwillimbury.

16. For example, the False Creek district energy project in Vancouver makes use of waste heat from sewage.

17. Toronto, Ottawa, Guelph, and Markham have all received funding for district energy feasibility studies through the Green Municipal Fund. The Markham system and two Toronto district energy systems (EnWave's Deep Lake Water Cooling and Exhibition Place) have also received funding for capital projects.

18. Ontario Ministry of Infrastructure, information provided to the ECO in response to ECO inquiry, May 14, 2013.

19. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2011 (Volume Two): Restoring Balance – Results* (Toronto, Ontario: 2012), 26.

20. Ontario Power Authority, information provided to the ECO in response to ECO inquiry, August 27, 2012, noted that 14 district energy projects had applied to CHPSOP (including the two successful projects). Ontario Power Authority, information provided to the ECO in response to ECO inquiry, June 21, 2013, noted that 11 of the district energy applications were from municipalities, however, five of these applications were from hospitals, which are not counted here as municipally owned.

21. Ontario Power Authority, information provided to the ECO in response to ECO inquiry, June 21, 2013.
22. Technically, the Ontario Power Authority's portfolio of province-wide electricity conservation programs must be cost-effective, but individual measures do not need to be cost-effective. Custom programs offered by local distribution companies, with the exception of pilot programs, low-income programs, or educational programs, must be cost-effective. The Ontario Power Authority's *OPA Conservation and Demand Management Cost Effectiveness Guide* (2010) assigns avoided greenhouse gas emissions a value of zero.

    Programs offered by natural gas utilities must be cost-effective, although there are exceptions for market transformation, low-income, research and development, and pilot programs. Again, avoided greenhouse gas emissions are assigned no value in the Ontario Energy Board's *Demand Side Management Guidelines for Natural Gas Utilities* (2011).
23. Ontario Energy Board, *Staff Discussion Paper: On Revised Draft Demand Side Management Guidelines for Natural Gas Utilities, EB-2008-0346,* 2011, 26.
24. Katherine Muncaster et al., *Adventures in Tweaking the TRC: Experiences from British Columbia* (2012).
25. The cost of new hydro in British Columbia (per unit of energy produced) is approximately four times the cost of natural gas. In its final decision, B.C. reduced the avoided cost to 50 per cent of the cost of new hydro (twice the cost of natural gas), in part to avoid undue rate impacts on gas customers.
26. For more information on making buildings district energy ready, see Community Energy Association, *Policy Options for District Energy Ready Buildings: Preliminary Consultation Report* (2011).
27. The appeal is case number PL110659 before the OMB. As of August 2013, the town was in negotiations with the appellants, and was hoping to avoid the need for an OMB decision on this issue.
28. Legislative Assembly of Ontario, *Planning and Conservation Land Statute Law Amendment Act, 2006,* Second Reading, Official Report of Debates (Hansard), April 19, 2006.
29. *Planning Act*, s. 41(4)
30. *Planning Act*, s. 51(24)
31. Provincial Policy Statement, 2005, sections 1.7.1, 1.8.2, 1.8.3, 6.0.
32. In 2011, emissions from buildings were 31.7 Mt, while emissions from electricity generation were 14.8 Mt. Environmental Commissioner of Ontario, *Annual Greenhouse Gas Progress Report 2013: Failing Our Future: Review of the Ontario Government's Climate Change Action Plan Results* (Toronto, Ontario: 2013), 7.
33. Government of Manitoba, *Focused On What Matters Most: Manitoba's Clean Energy Strategy* (2012), 39.
34. In particular, O. Reg. 608/06 - Development Permits, would be a candidate for amendments.
35. Association of Municipalities of Ontario, *AMO's Submission to the Ontario Distribution Sector Panel* (2012), 16.
36. The *Ontario Energy Board Act, 1998* (s.71) requires electricity distributors to carry out activities such as district energy through an affiliated corporation, the rules of which are governed by the Ontario Energy Board's *Affiliate Relationships Code for Electricity Distributors and Transmitters.* This ECO report (see Table 2) shows that a common structure for municipalities that own district energy systems has been to set up a holding company that includes both the regulated utility and the non-regulated affiliate. A similar affiliate code also applies to gas distributors, however, a 2009 directive from the Minister of Energy enabled Union Gas and Enbridge Gas Distribution to own certain assets, including ground source heat pumps, without the need for an affiliate relationship.
37. Ray Tomalty and Andrejs Skaburskis, "Negotiating Development Charges in Ontario: Average Cost versus Marginal Cost Pricing of Services," *Urban Studies* 34:12 (1997), 1996.
38. Ontario Ministry of Municipal Affairs and Housing, *Financial Information Return 2011: Provincial Summary,* Schedule 61 - Development Charges Reserve Funds for the Year Ended December 31, 2011.
39. Altus Group Economic Consulting, *Government Charges and Fees on New Homes in the Greater Toronto Area,* Building Industry and Land Development Association (June 2013), 23.
40. Jonathan Norman, Heather L. MacLean, and Christopher A. Kennedy, "Comparing High and Low

Residential Density: Life-Cycle Analysis of Energy Use and Greenhouse Gas Emissions," *Journal of Urban Planning and Development* 132:1 (2006), 10.

41. Canada Mortgage and Housing Corporation, "Infrastructure Costs Associated with Conventional and Alternative Development Patterns." *Research Highlights*, Socio-Economic Series, Issue 26.
42. Toronto Atmospheric Fund, Letter to City of Toronto Planning and Growth Management Committee, June 14, 2013.
43. Office of the Chief Administrator, Region of Waterloo. *Memorandum to Area MPPs - Development Charges Act Amendment - Transit*, April 19, 2013.
44. Ontario Public Transit Association / Canadian Urban Transit Association, *Investing in Public Transit: The Growing Need for Urban Mobility*. Pre-Budget Submission (January 2013).
45. Development Charges Subgroup, *Report to the Provincial-Municipal Fiscal and Service Delivery Review Infrastructure Table* (August 2007).
46. Ontario Professional Planners Institute, .Comments submitted on Environmental Registry #011-1329. *Draft Update of Ontario's Transit-Supportive Guidelines* (March 3, 2011).
47. It is also noteworthy that the Toronto Board of Trade has expressed similar concerns. In its Reaching Top Speed report of July 2011, the Board indicated that a key concern for Toronto region municipalities is the "limited ability for development charges to properly fund expensive new capital initiatives, such as transportation infrastructure, even in municipalities where growth is still occurring due to current provincial legislation that limits recovery from development based on a documented provision of service that does not exceed the average level available during the past ten years."
48. Metrolinx, *Investing in Our Region: Investing in Our Future* (May 2013), 71.
49. Metrolinx, *Investing in Our Region: Investing in Our Future* (May 2013), 71.
50. Hemson Consulting Ltd., *Development Charges Background Study – City of Toronto* (June 2013), Appendix D, Table 1, 364.
51. Development Charges Subgroup, *Report to the Provincial-Municipal Fiscal and Service Delivery Review Infrastructure Table* (August 2007), 20.
52. Development Charges Subgroup: *Report to the Provincial-Municipal Fiscal and Service Delivery Review Infrastructure Table* (August 2007), 23.
53. British Columbia Ministry of Community Services, *Development Cost Charge: Best Practices Guide* (2005), vi.
54. Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2011 (Volume One): Restoring Balance - A Review of the First Three Years of the Green Energy Act* (Toronto, Ontario: 2012), 17.
55. Power Application Group Inc., *Ontario Municipalities: An Electricity Profile,* prepared for the Independent Electricity System Operator (2008).
56. Ontario Ministry of Energy, "O. Reg. 397/11 Energy Conservation & Demand Management Plans: Energy into Action," slide 2 (presentation April 9, 2013).
57. Ontario Ministry of Energy, e-mail message to ECO staff, September 19, 2011.
58. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, June 10, 2013.
59. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, June 10, 2013.
60. Refer to O. Reg. 275/04 for further details.
61. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, June 10, 2013.
62. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, June 10, 2013.
63. U.S. Department of Energy, *2013 Efficiency Forum Report* (2013), 7.
64. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, June 10, 2013.
65. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, July 29, 2013.
66. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, June 10, 2013
67. City of Ottawa, *Green Energy Act - Energy Consumption Report for City Facilities - 2011.*
68. Section 7 of the Retail Settlement Code allows energy retailers to determine whether billing is handled by the retailer or the distributor.
69. Ontario Ministry of Infrastructure website, *Ontario Facilities Energy Consumption Directive.*

70. Canadian Urban Institute et al., *Integrated Community Energy Solutions (ICES): Municipal Policy Toolkit* (2011), 120.

71. Canadian Urban Institute et al., *Integrated Community Energy Solutions (ICES): Municipal Policy Toolkit* (2011), 123.

72. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, July 29, 2013.

73. See Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2009 (Volume Two): Re-thinking Energy Conservation in Ontario – Results* (Toronto, Ontario: 2010), 43, for a review of the results of the Home Energy Savings Program.

74. Sonja Persram, *Property Assessed Payments for Energy Retrofits: Recommendations for Regulatory Change and Optimal Program Features*, David Suzuki Foundation and Sustainable Alternatives Consulting Inc. (2011), 21.

75. See the series of three papers produced by Sonja Persram of Sustainable Alternatives Consulting Inc. for the David Suzuki Foundation for an in-depth look at how the LIC mechanism could be used to fund energy retrofits.

76. See Environmental Commissioner of Ontario, *Annual Report 2011/2012, Supplement: Losing Our Touch* (Toronto, Ontario: 2012), 162 for a full review of this Application.

77. Ontario Ministry of Energy, *Conservation First: A Renewed Vision for Energy Conservation in Ontario* (Toronto, Queen's Printer for Ontario: 2013).

78. CHEERIO resources and meeting notes are available online at the Clean Air Partnership website.

79. Ontario Ministry of Municipal Affairs and Housing, information provided to the ECO in response to ECO inquiry, June 10, 2013.

80. Ontario Ministry of Energy, information provided to the ECO in response to ECO inquiry, June 27, 2013.

81. Ontario Ministry of Infrastructure, information provided to the ECO in response to ECO inquiry, June 7, 2013.

82. The relevant programs for low-income individuals are the Ontario Power Authority's Home Assistance Program, Enbridge's Home Weatherization Retrofit Program, and Union Gas's Helping Homes Conserve program. See Enbridge's website for information on its pilot Community Energy Conservation Program, available only in certain areas.

83. See Environmental Commissioner of Ontario, *Annual Energy Conservation Progress Report – 2011 (Volume One): Restoring Balance: A Review of the First Three Years of the Green Energy Act* (Toronto, Ontario: 2012), 18, for an analysis of mandating energy audits at time of sale.

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